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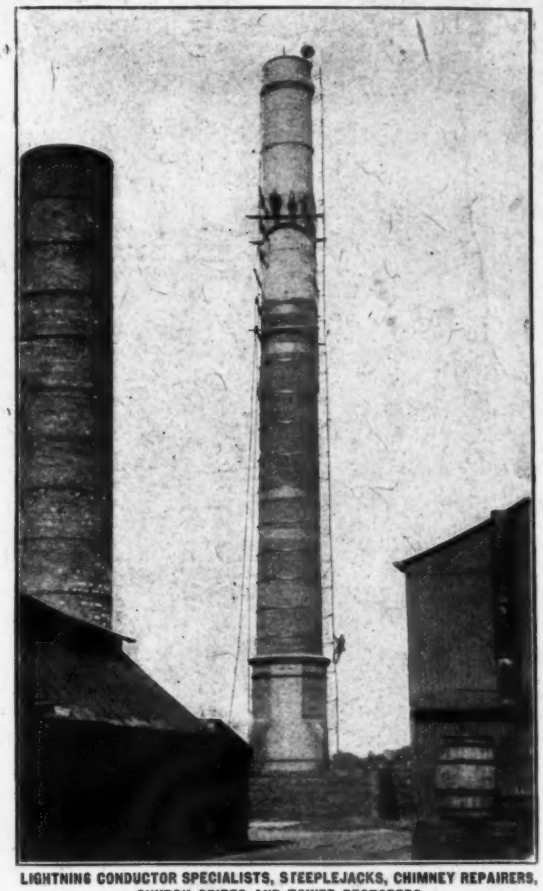

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ELECTRICAL REVIEW.

VOL. XC. JUNE 30, 1922. No. 2,327.

ELECTRICAL REVIEW.

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LOOKING AHEAD.

CIRCUMSTANCES of late have not enabled one to see very far ahead in regard to some matters. The atmosphere, however, seems to be clearing, and step by step—slowly perhaps, but we trust surely—we are entering a state of things where a greater degree of stability prevails, and the farther we go the stronger should be our confidence enabling us to proceed with assurance with various industrial enterprises. Seldom, if ever before, has there been so much large work in immediate prospect for the electrical industry as there is to-day, and perhaps never before has the promise of domestic electrical development been so bright. If we limit our outlook to two years for present practical considerations we can feel certain that it will be a period of almost unparalleled activity in all branches of the electrical trades, so that if all goes well the position of affairs ought to be most satisfactory at the time when the dual electrical event takes place at the British Empire Exhibition at Wembley Park. With uncertainty clogging the wheels, 1924 would seem a long way off, but as a matter of fact it is less than two years before the Electrical Exhibition will be opened and the World Power Conference will be held while it is in progress. For both of these undertakings, if they are to be the success which they ought to be, and we feel will be, all the time between now and then will be required for their efficient organisation. Many years have elapsed since the British electrical and allied industries held a large and representative exhibition of their manufactures, and the outlook is now favourable for making preparations for a serious demonstration of our productive ability. If the electrical exhibition runs the full length of the period of the British Empire Exhibition of which it will form a part, it will be the longest electrical display (April to October) that we have held in this country since the old Crystal Palace days. The exhibitions held at Olympia and at Manchester were successful events of but a few weeks' duration. For an exhibit that is to last many months, manufacturers will have to make somewhat different plans if they mean to secure results commensurate with the period and with the effort and the outlay involved. We can imagine, for instance, that some will desire to make changes in the character of their display, and to displace or add to their exhibited products, as the time passes. It is reasonable to suppose that there will be a continuous succession of arrivals of purchasing and specifying authorities from overseas as well as from Home, and they will want to see the latest thing out. The Exhibition being an Empire event should attract large numbers of Colonial visitors to these shores during 1924, and the World Power Conference should do likewise with the added electrical advantage that the delegates will be specially interested in our productions which are designed for the utilisation, transmission and electrical applications of the energy derived from the various power resources of the world.

In the foregoing we have limited our comments to the immediate industrial or productive aspect of the exhibition and conference, but the exhibition has another side which is of equal importance from the standpoint of our electrical relationship to the general public of the United Kingdom. Those who come to Wembley Park to see the Empire Exhibition will include vast crowds of British people who will care little for the technical side of our industry, but who are actual or prospective consumers of electricity for manifold purposes. Perhaps within the next two years we shall witness, as the result of trade revival, discreet propa-

ganda, and enterprising schemes, gratifying progress in this connection, but the ground is so vast and the opportunity so great, that there will still remain the need for large publicity and educational activity along lines which will lead unmistakably to the full popularisation of electricity as the greatest means on earth of meeting household needs and the requirements of many small trades. We have had scores of admirable local electrical shows which have amply demonstrated the interest of local householders in electricity and its ability to serve them, and before 1924 there will doubtless be many more. But the British Empire Exhibition will make many a popular appeal which will draw hundreds of thousands of visitors from all parts, and nothing would be more fitting than that electricity should present such a demonstration as has never before been made here or anywhere else, causing it to be the grand outstanding theme of conversation and of publicity in our newspapers during a number of months.

From what we have said, it will be obvious that there are two great ends to be sought in the organisation of this dual event: The education of the world regarding our technical productive or manufacturing capacity and efficiency so as to assist the British electrical and allied industries, and the education of the general public so as to add to the use of electrical contrivances in the home, benefiting the electricity undertakings by the sale of electricity and all departments of the trade by the sale of hundreds of thousands of such appliances. The first conviction that emerges from such a view of the needs of the case, is that those responsible for the preparation of plans and the execution thereof should be men of imagination and men of experience, and that they should represent every department of electrical science and industry. There should be no ground for criticism that any interest with the remotest legitimate claim to have a voice in the inner conduct of affairs has been left out, though nobody will recognise more readily than the technical Press itself that there are those who in the true interests of all should be left free to exercise their own special functions from outside rather than have their wrists shackled by holding office within.

The I.M.E.A. Convention.

The Convention which came to an end on Friday last achieved a success which reflected the greatest credit on the organisers; they had many difficulties to contend with, of which perhaps the most formidable was the accommodation of so large a gathering, entailing its dispersion at different centres. The members did more travelling at this Convention than on any previous occasion, but with the aid of the charabanc considerable distances were traversed daily without notable discomfort. The weather, if fickle, was fair on the whole, and the programme provided abundance of scope for the activities of all the visitors, male and female. Mr. S. T. Allen and his indefatigable staff are to be congratulated upon the happy outcome of their labours, and the Mayor of Wolverhampton, Councillor Thompson, and his committee offered the most generous hospitality to their numerous guests.

From a professional point of view, chief interest centred round the paper by Lieut.-Col. Vignoles and the discussion thereon; the development of the domestic load, with which is associated the problem of "tariff reform," so to speak, is the foremost question of the moment, and great interest was manifested in the subject. In this connection the Hackney scheme of Mr. L. L. Robinson, which we described last week, is of special value as embodying a bold and enterprising policy, which can be carried out without waiting for powers to abolish the flat-rate in favour of the multipart tariff. It is somewhat significant that Lieut.-Col. Vignoles, who has already secured those powers, does not propose to impose the multipart tariff upon his consumers willy-nilly, but will educate users to appreciate its merits before he adopts drastic measures.

Keen interest was also shown in the magnificent power station of the Birmingham Corporation which Mr. R. A. Chattock is erecting at Nechells, obviously representing a very large outlay, and containing plant of the highest quality obtainable. We hope that at no distant date the demand for electricity in the district will so develop, with improved industrial conditions, that this fine installation will be fully loaded night and day. Lieut.-Col. Vignoles is the new president of the Association, and therefore next year's Convention will presumably be held on the East Coast—unless in the meantime arrangements are made for the holding of a National Electrical Convention in 1923.

South-East Lancashire.

The supplementary inquiry which the Electricity Commissioners held at Manchester last week, in accordance with the Act, was brief and businesslike, and at its conclusion the Chairman said that probably this would be the first order to be made and confirmed; thus Lancashire leads again, and justly—for it was in South-East Lancashire that the first attempt was made to work out a co-operative scheme, long before the Act of 1919 came into existence. Several interesting points were raised, some of them due to the difference between the position of an Advisory Board and that of a Joint Electricity Authority, and these may be the subjects of amendments to the Bill now before Parliament; and certain questions were reserved for consideration by the whole of the Commission. The atmosphere of the inquiry was one of co-operation and agreement, and opposition to the scheme was wholly absent. It is just two years since the area was delimited, and this was the first supplementary inquiry held by the Commissioners. Evidently it will be a long time before the reorganisation schemes are all in operation.

The Palestine Problem.

On Wednesday last week the House of Lords repudiated the Palestine mandate in its present form by 60 votes to 29, in spite of the powerful advocacy of Lord Balfour. The adverse vote was due in great part to the Rutenberg concession, which was commented on by Mr. Theodore Stevens in our issue of June 2nd, 1922; reports from New York indicate that Mr. Rutenberg has raised £450,000 in the United States, in addition to half a million raised in Europe, making a total of £950,000 out of the million at which he estimates his requirements. Most of the American support is derived from the Palestine Development Council and independent Zionists; the European contribution is doubtless also of Jewish origin. Thus the economic future of the people of Palestine, the vast bulk of whom are not of Jewish nationality, is to be entrusted to a Russian Jew in preference to all other applicants, and financed by aliens, this country, however, bearing the cost of the administration of Palestine and guaranteeing the concession. Whether there is any water-power available throughout the year within the borders of the Promised Land as now delimited is more than doubtful, and Mr. Rutenberg apparently places more reliance on oil than water; but in any event, plant will be required, and bitter experience tells us that it will not be purchased in this country if we do not provide the capital. We agree that the mandate to this country does not, and should not, grant us a monopoly of the trade of Palestine—but seeing that we bear the cost of its liberation, its administration, and its defence, undoubtedly our industries are entitled not merely to equal opportunities, which have been denied to them, but to a material preference.

The concession is to be discussed in the House of Commons on Tuesday next, and we hope that the matter will be thoroughly thrashed out.

THE INCORPORATED MUNICIPAL ELECTRICAL ASSOCIATION.

THE ANNUAL CONVENTION AT WOLVERHAMPTON.

(*Continued from page* 868.)

It is generally understood that Wolverhampton, if not situated within the "Black Country," is at any rate on the border of that district; it was, therefore, an agreeable surprise to many of the visitors to find the town a pleasant, cheerful place, and still more to make acquaintance with the beautiful country in which it is set. The drive to Apley Terrace, in a column of charabancs, passed through charming scenery of diversified character, culminating in the sylvan beauties of the Terrace, whence delightful views of Apley House nestling in the valley, the River Severn, the Wrekin, and the Malvern Hills were enjoyed. For the benefit of the visitors who were interested in the question, we may note that the height of the Wrekin is 1,320 feet above sea-level. Apley House competed with Sandringham for the honour of becoming the country seat of the Prince of Wales who ascended the throne as Edward the Peacemaker.

Having viewed the scenery from the Terrace, the party scrambled down rugged paths to a pretty glade on the bank of the river, and partook of tea and refreshments in a marquee as the guests of the Mayor and Electricity Committee of Wolverhampton. Music was provided by the band of Messrs. John Thompson's Boiler Works. Afterwards a panoramic photograph was taken, which we reproduce herewith; the original print was four feet in length. An amusing incident occurred during a second exposure of the film; the rotating camera, after covering about one-sixth of its travel, came to rest, and the question arose: "Who stopped the camera?"

The return journey to Wolverhampton was made by a different route, *viâ* Shifnal, again through picturesque scenery, and the day's events concluded with a reception given by the Mayoress of Wolverhampton at the Art Gallery, where an excellent musical programme was performed.

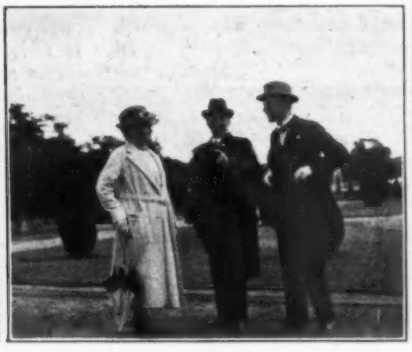
On Wednesday, June 21st, the members assembled at Stoke-on-Trent, driving in charabancs from Wolverhampton and Birmingham. The journey in the former case occupied about two hours, but the Birmingham contingent arrived an hour late, so that the time available for the morning meeting was curtailed. The Convention received a cordial welcome from the Mayor of Stoke-on-Trent, Alderman S. Sproston, and after Mr. S. T. Allen's response, Mr. E. Calvert (chief electrical engineer, Finchley) read in abstract a paper on "The Administration and Control of Electricity Departments."

In the discussion which followed, Ald. Sennington, Mr. F. W. Purse, Mr. C. H. Wordingham, Mr. N. Staniland, Councillor F. Burgess, Councillor Dunn, Major Attlee, Mr. J. W. Beauchamp, Mr. L. L. Robinson, Councillor Crawford, Councillor Ward, and Councillor Wilkins took part. Mr. Calvert briefly replied, and after a vote of thanks had been accorded to the author, the members adjourned for luncheon at the invitation of the Electricity Supply Committee of Stoke-on-Trent, in the fine King's Hall. Ald. H. Leese, chairman of the Committee, presided. After the loyal toasts, Councillor W. Bruce Lindsay, chairman of Edinburgh Electricity Supply Committee, proposed "The County Borough of Stoke-on-Trent," referring to the recent amalgamation of the six townships and the reorganisation of the electricity supply of the borough. The Mayor responded, pointing out that an ample supply of electricity was now available in the borough, under the able management of the borough electrical engineer, Mr. C. H. Yeaman, and the chairman, Mr. Ald. Leese, and foretelling a prosperous future for the town.

During the meal the borough organist entertained the guests with a number of items, including a striking imitation of a thunderstorm, and at its close he performed the "Overture to Tannhäuser."

Many of the potteries for which the town is famous were open to inspection, and attracted large parties of members and their ladies; the central power station, which has recently been largely extended*, was visited under the guidance of Mr. C. H. Yeaman, and the main sub-stations were also open. Afterwards the members reassembled at Trentham Park, formerly the seat of the late Duke of Sutherland, where the terraced gardens were greatly admired. After tea the members returned by charabancs to their respective hotels, and spent the evening as they chose. As on the previous day, the long drive from Wolverhampton for almost the whole distance passed through lovely country, and the weather, though dull, was fair.

Mr. and Mrs. S. T. Allen, Lt.-Col. and Mrs. W. A. Vignoles, Cclr. and Mrs. Thickett, and Mr. S. E. Britton.



Mr. and Mrs. S. T. Allen, and Councillor C. G. Jenks.

Mr. W. M. Selvey, Miss M. A. Davies, and Mr. C. H. Yeaman.

SNAPSHOTS AT TRENTHAM PARK.
By courtesy of Mr. C. W. Charlesworth.

On Thursday morning the Convention was held at the Witton works of the General Electric Co., Ltd., meeting in the main hall of the Magnet Club, which has been provided by the company for its staff. The managing director, Dr. Railing, received the guests, and Mr. R. A. Chattock, city electrical engineer, Birmingham, read a paper on "Sub-station Equipment." A discussion followed, in which Mr. S. J. Watson, Mr. S. E. Fedden, Mr. W. H. Alabaster, Mr. R. B. Mitchell, and Mr. R. L. Morrison took part. Mr. Chattock replied, and was accorded a vote of thanks for the paper.

After a tour round the Witton works†, luncheon was served, at the invitation of the General Electric Co., Ltd., in the large theatre of the Magnet Club, the cooking being done in the very fine all-electric kitchen, of

* Elec. Review, April 21st, 1922, p. 543.

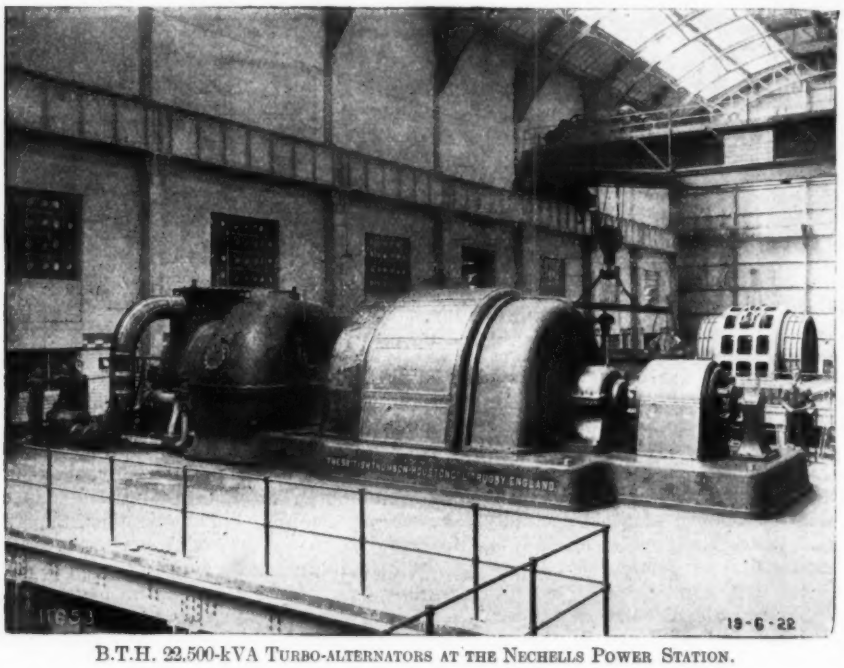
† An article on the Witton Works appeared in the Elec. Review of February 17th, 1922, p. 219.

which we shall give particulars in a later issue. Mr. H. Hirst, chairman of directors, presided, and after the loyal toast, Mr. S. T. Allen proposed the health of "The General Electric Co., Ltd.," remarking that the visitors had been impressed by the splendid organisation of the works, and offering special thanks on behalf of the representatives of competing firms who had been permitted to inspect the workshops. The electricity supply industry, he said, was bound up with the manufacturing concerns, and it was to its interests that the latter should be big and prosperous, just as it was to their advantage that the supply industry should steadily progress. It was a national calamity that great concerns like this, involving millions of capital, should from time to time be put out of operation by repeated strikes, and he hoped that joint conferences of employers and employed would find some way of avoiding these troubles. The toast was enthusiastically honoured, and Mr. Hirst, in response, recalled the previous visit of the I.M.E.A. to Birmingham eight years ago. Much had happened since then; now the world was slowly recovering, and it was their common object to help on its convalescence. The world could only come right if Britain was right, and there was only one way to attain that end—by producing cheap electricity, to restore industry and provide employment for the workers of this country. Pre-war notions of individualism were gone for ever; the man who lived for himself was a parasite. The General Electric Co. was not in business merely to make money or annoy its competitors; it had gathered together brains of high technical and scientific attainments, and would use its opportunities not for its own best advantage, but for that of the whole country. Its ideal was to build up a concern that would stand comparison with the most powerful firms abroad, and it needed the help of all the members of the I.M.E.A.

Mr. Hirst then proposed the health of the Association, and Mr. A. S. Blackman, vice-president, responded. He agreed with regard to the necessity of cheap electricity, as well as the community of interests between the I.M.E.A. and the manufacturers of electrical plant, and pointed out that the Executive Council had been in collaboration with the manufacturers in the direction of standardisation; many standard specifications were already completed and others were in progress.

Photo by] THE INCORPORATED MUNICIPAL ELECTRICAL

The next event was a visit to the Nechells power station of the Birmingham Corporation, the first section of which is approaching completion. This power station *de luxe* is noteworthy for the adoption of devices for economising heat and ensuring the continuity of supply; it will become one of the "super-stations" contemplated in the national scheme.



B.T.H. 22,500-kVA TURBO-ALTERNATORS AT THE NECHELLS POWER STATION.

We illustrate herewith the two 18,000-kW (22,500-kVA) turbo-alternators which have been installed by the British Thomson-Houston Co., Ltd., running at 1,500 r.p.m. and generating 3-phase, 25-cycle current at 5,250 volts. These are mounted in a spacious and lofty engine-room, with the auxiliaries in an open basement between them. A novel feature of the generating sets is the auxiliary d.c. generator, which is mounted on the main shaft under the same housing as the exciter, the former supplying current to the pump motors.

The main switch-room, containing a magnificent equipment of Reyrolle iron-clad switchgear of the heaviest types, on similar lines to that of the Dalmarnock power station, aroused great interest amongst the visitors; the large reactance coils embedded in concrete blocks were also unusual if not novel features of the installation. Externally, the elaborate coal-conveying plant and the numerous cooling-towers are worthy of mention.

From Nechells, in showery weather, the members drove to the Botanical Gardens, Edgbaston, where they were received and entertained at a garden party by the Lord Mayor and Lady Mayoress of Birmingham, Alderman and Mrs. David Davis, in charming surroundings. Fortunately the weather improved, and there were occasional bursts of sunshine, which went far to obliterate

the memory of the showers. A programme of music was performed by the City Police Band, and a musical entertainment was also provided by "The Greys," whilst refreshments were partaken of in a marquee.

In the evening the annual dinner was held in the Royal Field Artillery Headquarters, Wolverhampton. The president, Mr. S. T. Allen, occupied the chair, and there was a large attendance of members and guests.

[We are informed by Mr. E. J. Jennings, secretary of the District Industrial Council for the Electricity Supply Industry, No. 5 (West Midlands Area), that Mr. R. A. Chattock has been chairman of the Council since its inception—not, as stated in our last issue, Mr. S. T. Allen, though the latter took an active part in the work of the Council when wages schedules were being formulated. We regret the error.—EDS. ELEC. REV.]

(To be concluded.)

ASSOCIATION, AT APLEY TERRACE. [*Whitlocks, Birmingham.*

The Extension of the Use of Electricity for Domestic Purposes.

By Lt.-Col. W. A. VIGNOLES, D.S.O.,
Borough Electrical Engineer, Grimsby.

(*Abstract.*)

THE subject of this paper is of vital importance to the electricity supply industry at the present time.

The relative value to an electricity undertaking of any class of load is represented approximately by the number of hours during the year that such load is in use (*i.e.*, by the load factor). There is a very great variation in this respect between offices, shops, houses and theatres. Fig. 1 shows the load cuvre for the Grimsby undertaking for Friday, 16th December, 1921, when one of the heaviest loads of the season was recorded. The area inside the main curve has been divided up so as to separate out the loads due to the principal classes of consumer, whose combined demands produce the main curve.

The analysis of a series of load curves, and the study of the hours during which shops and other premises use light, show that the number of hours per annum during which electricity is required, or likely to be required, by certain classes of consumer is roughly as shown below, pre-war figures being given for comparison—

	Hours per annum. 1922.	Pre-war.
(*a*) *Offices: Lighting*—		
Five days per week for three or four months	175/200	175/200
Offices: Heating—		
Say 20 weeks at 45 hours	900	900
(*b*) *Shops: Lighting*—		
(1) Closing 6 p.m. and 7 p.m. ...	450	600
(2) Closing 7 p.m. and 8 p.m. ...	650	800
(This is on the basis of 5 days per week; very little required in summer months.)		
(*c*) *Theatres and Kinemas*—		
Six days per week throughout the year	1,200	1,200
(*d*) *Factories and Workshops*—		
47 hour week (pre-war 54)		
Power	2,360	2,710
Lighting	250	400
(*e*) *Domestic Consumer*—		
Lighting	1,250	1,450
Heating	2,500	2,500
Cooking	3,250	3,250

These are the hours during which some electricity may be used; the actual number of hours' use of the M.D. will, of course, be less. The following are a few actual figures:—

	Hours per annum max. demand.
Grimsby—	
Power (including off-peak supplies)	2,130
Power (excluding off-peak supplies)	1,600
Heating estimated at	1,500
Newcastle—	
Lighting, cooking and heating on a housing area	1,760
Norwich—	
Heating and cooking estimated at	1,000

Reliable figures are not easy to obtain, but with heating a new kind of peak has to be faced, which may be called a "cold snap" peak. The curves in fig. 2, supplied by Mr. F. M. Long, city electrical engineer, Norwich, show that with a sharp fall in temperature the day load increased by 1,000 kilowatts, and the peak load by 750 kilowatts.

If cooking is considered the following points emerge:—

(*a*) There would be no "cold snap" peak, and the experience of the gas undertakings is that the heaviest load occurs on Sunday mornings, when the power load is at a minimum.

(*b*) The demand in the summer would be higher than in the winter, as during the cold months some coal fires would be used.

(*c*) The increase in the peak load would be small, as on week-days the heaviest load, except among those classes where "late" dinner is the rule, would be about mid-day. For these reasons the writer estimates that for this class of load the units will reach at least 3,000 per annum for each kW added to the peak load.

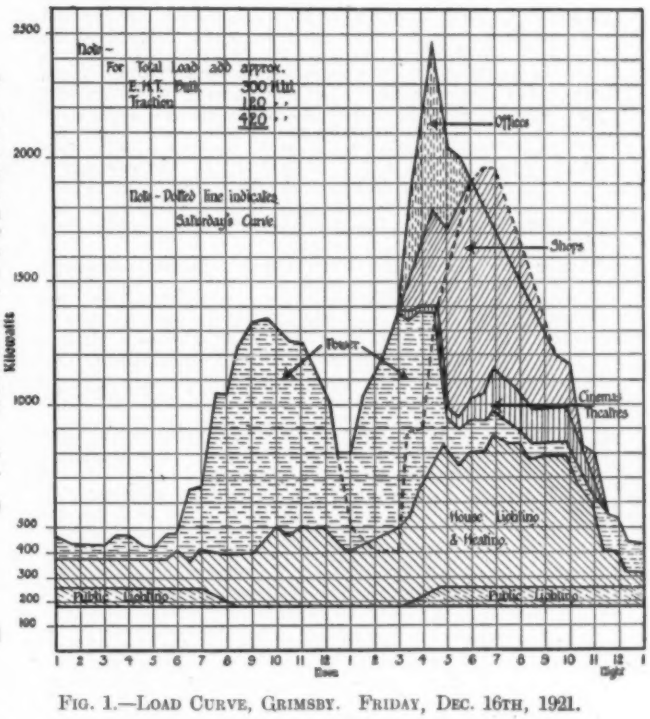


FIG. 1.—LOAD CURVE, GRIMSBY. FRIDAY, DEC. 16TH, 1921.

Another type of load that will offer great advantages to the supply undertaking is that known as thermal storage. Electricity is applied to heat water, or some heat-retaining substance, during "off-peak" hours, the heat stored being sufficient to carry over the peak. The possibilities in this direction are very great.

Great efforts should be made to encourage the sale of electricity for cooking purposes, so that this business may grow in conjunction with the supply for heating, which does not require much pushing once a favourable tariff is adopted.

The cost of supplying a consumer with electricity can be divided into:—

(*a*) Consumer cost, *i.e.*, expenses directly due to dealing with the additional consumer; *e.g.*, clerical and administrative expenses and capital charges on service, &c.

(*b*) Standing charges proportional to the consumer's M.D.

(*c*) Running costs proportional to the units consumed.

Fig. 3 shows the average cost per unit plotted against hours' use per annum of the M.D. for the following cases:—

Curve (*a*) The cost at the present time in Grimsby of

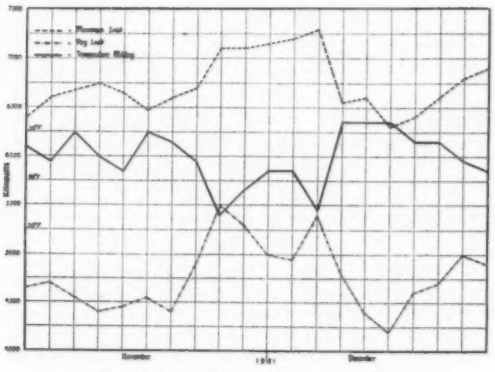


Fig. 2.—"Cold Snap" Peaks at Norwich.

supplying a consumer with a M.D. of 1 kW, coal assumed to cost 20s. per ton (supply is direct current), based on the formula:—

£2 per annum per consumer plus £20 per annum per kW of M.D. plus .75d. per unit sold.

Curve (*b*) The cost for direct current supplies in Wolverhampton as stated in Mr. Charlesworth's paper, read at last year's Convention, based on the formula:—

£15.1 per annum per kW of M.D. plus .423d. per unit sold.

From curve (*a*) it will be seen that the average cost per unit in Grimsby of supplying a shop consuming 450 units per annum per kW of M.D., which is the approximate figure for a shop closing at 6 p.m. and 7 p.m., is about 1s. per unit as compared with a charge of 10d., while from curve (*b*) the cost in Wolverhampton is seen to be about 8½d. per unit, the charge being 8d. The average cost for supply to offices, where the number of hours' use is only some 200 hours, runs up to the very high figures of 22d. in the case of Grimsby, and 19d. in the case of Wolverhampton.

Undertakings therefore have at the present time to face the fact that on a flat rate of even 8d. or 10d. per unit a substantial number of consumers are being supplied at a loss, while the falling-off in the demand for power, owing to the slump in trade, is seriously diminishing the revenue from power consumers.

Each year the average size of the domestic installation requiring connection becomes smaller, and the problem of supplying such consumers without making a loss is acute. The number of these small consumers, and in fact of any class of consumer on which a loss is made, tends to increase because such consumers are obtaining something below the market value; the large long-hour consumer, on the contrary, will put in his own plant if undertakings charge a price that brings in more than a reasonable profit.

Undertakings will shortly have to compete with large private plants purchased at very low post-boom prices, while the extension of the undertaking during the boom period may have caused considerable inflation of the capital account. Gas competition is also very keen at present, and the gas companies are bringing out once more the old test figures which prove conclusively (to the gas mind) that electricity is dearer than gas. The answer to all such absurd statements is the actual bills incurred by consumers; the figures relied on by the gas interests do not represent actual conditions.

To show the probable magnitude of a domestic load where a suitable charge is made for heating and cooking, the following approximate figures are given for five different towns; these figures show the average consumption in a house where no gas is used, and where part of the cooking and heating is done by electricity:—

No. 1.—2,000 to 2,500 units per annum per house (140 for lighting).

No. 2.—2,000 to 2,800 units per annum per house.

No. 3.—Six times the lighting consumption.

No. 4.—1,300 units per annum per house (housing area).

No. 5.—Ten times the lighting consumption.

In another town with a tariff of 2½d. per unit and no special effort made to develop the heating load, 350,000 units (out of a total of 2,900,000 units) were sold for heating, divided among 700 consumers, or 500 units per consumer taking a supply for this purpose.

The heating load builds up rapidly under a suitable tariff; thus to quote a few figures for sales:—

	Sales in 1921.	
Norwich ...	1,500,000 units at 2d. to 1½d.	
Glasgow ...	6,859,000 ,,	
St. Marylebone	2,000,000 ,,	on a flat rate for heating and cooking.
Ditto ...	7,000,000 ,,	on a multipart tariff for light heat and cooking.

As regards connections to the mains, Norwich had over 5,000 kW of cooking and heating appliances connected to the mains at the end of 1921, and Glasgow had 26,907 kW.

Assuming that the domestic consumer would use 1,500 to 2,000 units per house per annum (a very safe figure), the sales for this purpose would be 15 to 20 million units per annum, if only half the houses were supplied on this basis, in a town with a resident population of 100,000 in 20,000 houses. In most towns such a load would be considerably greater than the power load, unless the area was entirely industrial.

It is useless to attempt to develop this business by publicity unless the undertaking is in a position to "deliver the goods." And by this the writer means that the consumer can be satisfied he is obtaining value for his money.

The two essentials are:—

(*a*) The price for the electricity used must bear comparison with the cost of coal or gas.

(*b*) The apparatus must not be too expensive and must give little trouble.

If these conditions are fulfilled, publicity will assist the undertaking in building up this class of business, provided that personal efforts are also made to bring home to the consumer the benefits that he can obtain from the use of electricity for these purposes. No amount of publicity can replace the skilled canvasser or demonstrator.

From what has been stated above it is clear that a two-part tariff is the only fair way of charging for electricity for all purposes. At present an alternative flat rate must be offered; such a flat rate can, however, be the maximum price authorised, and the writer strongly recommends that the flat rate for lighting should, in fact, be fixed at this maximum price, and that all reductions offered should be in the form of a two-part tariff.

In the two-part tariff the first charge should be divided into two items, (*a*) a fixed sum per consumer, and (*b*) a charge per kW of M.D. or its equivalent.

The running-charge portion of the tariff must cover that portion of the expenses which increases in proportion to the output; it should not be higher than 1½d. per unit, and is less in a number of towns.

In Grimsby the tariff for general purposes has been fixed on the basis of £2 per annum per consumer, £20 per annum per kW of M.D., and 1½d. per unit. For private houses in the borough the first charge will be £2, plus 20 per cent. of the rateable value of the premises.

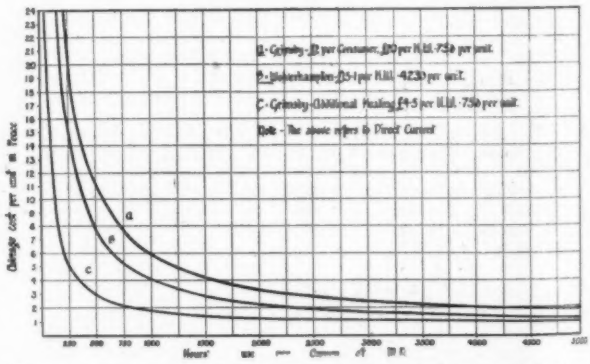


Fig. 3.—Average Cost Per kWh in Relation to Hours' Use Per Annum of M.D.

For other premises the M.D. charge is to be calculated on the estimated M.D. for lighting, based on an inspection of the premises, with an addition of £1 per kW of the heating or cooking load during "peak" hours.

The cost of supplying the additional heating or cooking load, allowing for thickening-up mains and feeders, as may be necessary, is estimated at £4 10s. per kW of M.D. and .75d. per unit sold (with coal at 20s. per ton). This is plotted on Curve (*c*) fig. 3, and may be conveniently tabulated thus:

	Average Cost per unit.
Office heating, say 900 hours' use per annum ...	1.9d.
Domestic heating, say 2,500 hours' use per annum	1.3d.
Domestic cooking, say 3,250 hours' use per annum	1.1d.

It will be seen, therefore, that a flat rate of 1½d. per unit will cover the cost except in the case of office heating; the addition of a charge per kW is therefore especially necessary in this case.

The tariff should be framed with an eye to competition, and it will be found that as far as lighting is concerned it is not necessary to cut the price very finely. The price for other purposes than lighting, again fixed in relation to competition, must be such that all expenses directly incurred in giving the supply are covered, but the ratio:

Price of gas per therm/Price of electricity per unit for heating and cooking, should not be less than 6.5. Thus with gas at 10d. per therm, a fair competitive price for electricity would be 1½d. per unit.

Much progress has been made during the last few years in the construction of apparatus, and the experience of the writer is that the cost of maintenance is not excessive even if the apparatus is handled by servants. It must be recognised, however, that elements do fail at times, and apparatus should therefore be designed so that hot plates can be changed readily, or elements removed by an unskilled man.

So far the cost of apparatus has been too high to be hired at an economic rent, a complete cooker with oven, grill, and hot plates being listed at £18 to £22. The writer is convinced that such a price is due to the comparatively small output obtained by firms producing this class of apparatus. He suggests, therefore, that the engineers of undertakings, prepared to develop this business, should meet together with a view to buying apparatus in bulk.

The engineers should study the various appliances on the market, decide on one type and standardise this in their towns, this standard type only to be available for hire; this would enable, say, 20 towns each to purchase 50 cookers, at a price based on an order for 1,000 sets. Such a policy would undoubtedly have a big effect on the price at which cookers could be obtained.

It may be assumed that the price for an electric cooker, if the demand can be stimulated, will not exceed £10 to £12. To hire this out on the basis of a seven years' life, the period allowed by the Commissioners, would cost £3 or £4 per annum, including maintenance. If the apparatus is well looked after, however, the life should certainly be ten years, as the elements and switches are the only parts likely to be damaged. Further, it is suggested that sums should be appropriated from profits for the purchase of these cookers; the rental could then be fixed at an amount not much greater than the cost of maintenance.

This rental should be a figure that would compete with the ordinary hire rental of a gas oven, but could probably be slightly greater in view of the superiority of the article offered.

Profits invested in this manner would bring large returns in the shape of an increased output of electricity; the soundness of such a policy depends, of course, on the rate per unit charged for cooking. But the profit on the supply for cooking will be greater than on sales for heating, owing to the greater diversity factor, and the more extended use during the year. Therefore, what may be sound as regards cooking, is not necessarily so in respect of heating.

It is not necessary to hire such apparatus as radiators, as these are obtainable at a price which is within the reach of all.

The following list of apparatus hired at Newcastle, showing the cost and rentals received, is taken from an article written by Mr. W. F. T. Pinkney, published in the *Electrician*. Mr. Pinkney advises the inclusion of a fitted kettle with each cooker, and this appears to be a sound idea, as it will undoubtedly tend to economy in the use of electricity.

Apparatus.	Net cost. £ s. d.	Retail Price. £ s. d.	Average maintenance cost per annum. £ s. d.	Rental per annum. £ s. d.	Approx. units sold per item per annum.
Iron	0 12 8	1 1 0	0 1 0	0 6 0	35
Kettle, 2 pt.	0 16 0	1 10 0	0 2 8	0 8 0	50
,, 3 ,,	1 10 0	2 10 0	0 2 8	0 10 0	70
Fires ...	1 10 0	2 12 6	0 2 7	0 12 0	500/1,000
Cookers ...	12 10 0	22 0 0	1 0 0	1 10 0	1,600
,, ...	16 0 0	25 0 0	1 0 0	2 0 0	1,750

If satisfaction is to be given apparatus hired must be maintained, and arrangements must be made by the Department to deal promptly with all complaints and breaks-down. Elements must, therefore, be easily renewable at the consumer's premises, or in the case of hot plates, the plates must be readily removable, so that a new plate can be fitted while the old plate is under repair.

It is also essential that the Electricity Department should keep in close touch with consumers using cooking apparatus, and to do this there seems no method better than the employment of a tactful lady demonstrator.

THE TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.—I.

ANNUAL CONGRESS AT BOURNEMOUTH.

The fourteenth annual Congress of the Tramways and Light Railways Association was held at Bournemouth on June 22nd and 23rd.

The proceedings were opened by the Mayor, Ald. C. H. Cartwright, who welcomed the members and their wives; the reception was followed by a discussion opened by Mr. Bulfin, Bournemouth Corporation tramway engineer, who gave the results of his experience with rail-hardening *in situ*. Neither Mr. Bulfin's nor Mr. Munro's paper was read, but a very full discussion followed Mr. Munro's opening remarks, many of the speakers giving very interesting details of their experience with railless and petrol cars as contrasted with the tramcar.

The discussions were followed by a demonstration of the Sandberg *in situ* process of rail-hardening and an inspection of the railless car shown by the Bournemouth Corporation.

The party then took luncheon with the Mayor at the Town Hall, and afterwards proceeded by motor omnibus to various beauty spots around Bournemouth, finishing at a delightful riverside tea garden at Tuckton Creats, where the members and their wives were entertained to tea by Mrs. Bulfin. The return to Bournemouth completed the formal arrangements for the day.

Friday morning was occupied by the general meeting of the Association, and the paper on "Modern Improvements in Tramway Rolling Stock," by Mr. C. J. Spencer, of the London Underground Railway Companies.

After luncheon members were free for the afternoon, and a number took advantage of the opportunity to visit the New Forest.

In the evening the annual dinner took place, the Mayor of Bournemouth and other Corporation officials attending as the guests of the Association, who were fortunate in having with them their president, the Hon. Sir Arthur Stanley, G.B.E., M.V.O.

A very pleasant evening concluded a most enjoyable and well-attended conference, upon the success of which the chairman, Mr. C. G. Tegetmeier, and the ever-energetic secretary, Mr. A. de Turckheim, O.B.E., must be heartily congratulated.

The custom of including ladies was resumed at this, the first congress held under pre-war conditions since the congress held at Newcastle-upon-Tyne in 1914.

Bournemouth Corporation Tramways.

By I. Bulfin, M.I.E.E.

Abstract.

The British Electric Traction Co., in 1899, obtained its Light Railway Order for the construction of 3¾ miles of railway in the Poole area in a westerly direction, and opened the line for traffic in 1901. In 1900 the same company promoted a Christchurch and Bournemouth Tramways Act, 1900, for a tramway in an easterly direction. The Bournemouth Corporation (as a blocking measure) promoted in the same year the Bournemouth Corporation Tramways Order, 1900, and the Hotel Metropole to Pokesdown line in the British Electric Traction Co.'s Act was held in abeyance, subject to the Bournemouth Corporation constructing the line within two years. Two years expired before substantial progress was made, with the result that in 1902 the British Electric Traction Co. issued an injunction against the Bournemouth Corporation, as its powers had lapsed, and in order to retain the tramways in its own area it became necessary to buy out the British Electric Traction Co. both on the Poole and Christchurch sides. Owing, however, to trouble with the Dorset County Council, the Poole Corporation bought the Poole line, and leased it to Bournemouth for a period of 30 years.

The Poole Corporation imposed conditions which became later a source of continual trouble, and placed the Bournemouth Corporation in the position of not being able to make use of the Tramways (Increase of Charges) Act until March, 1921, when the Bournemouth Corporation took over the whole of the outstanding loan charges on the Poole undertaking.

The amended Bournemouth scheme was for a double line of tramways through the whole of the main route on the trolley

system, but in the centre of the town the "conduit" system was installed identical with the centre-slot L.C.C. system, but laid and run prior to the latter. The "conduit" system was run for some ten years when, owing to heavy wear of rails and conductor tees, it was decided to abandon the conduit and run the entire system as a trolley system.

The main lines in Bournemouth were opened to traffic in 1902 and the side routes in 1903. The tramways to Christchurch were constructed by the Bournemouth Corporation and opened for traffic in 1905, and in 1906 the Lower Parkstone line was opened for traffic. At present the route mileage of the system is some 23 and the length of single track over 33 miles, and runs in three boroughs—Poole, Bournemouth, and Christchurch.

The permanent way, laid in 1920, 1921, and 1922, with transverse sleeper construction every 5 ft. apart and Thermit joints and B.R.C. reinforcement, cost per mile of single track with wood block paving between £18,000 and £19,000. Corrugation has been very prevalent all over the system, but the Sorbitic *in situ* process has been most satisfactory, and unquestionably is the only method to prevent a recurrence of this evil.

The rolling stock consists of 112 cars—67 bogie and 45 single trucks; the equipment is of the British Westinghouse and British Thomson-Houston types. The brakes are peculiar to the system, and were designed and supplied by the British Westinghouse Co. They are combined magnetic and track brakes, and can be applied either electrically or by hand. They are very complicated, and maintenance and upkeep is very heavy. The maximum gradient is 1 in 12, the sharpest curve some 40 ft., and the gauge is 3 ft. 6 in., which conditions preclude the possibility of the use of top-covered cars.

In Bournemouth the capital charges work out at over 9d. per car mile, and the financial position of the undertaking is dependent entirely on visitors; a surplus is made from April to September in each year sufficient to meet the loss on running between October and March, and in some cases to leave a surplus balance at the end of the year. For the financial year ended March 31st, 1922, the total revenue of the undertaking was £207,356 and the working expenses £146,161, the net profit on the tramways being £158 and on the motor 'buses £60. The number of passengers carried was 24,271,692.

In connection with the paper there was a demonstration of the Sandberg rail-hardening process at the tramway depôt.

Discussion.

Mr. C. J. SPENCER was interested to hear Mr. Bulfin's opinion that by hardening the rail by the Sorbitic process *in situ* the corrugation disappeared, and mentioned the very common rolling-stock problem of the "jazzing" or "tail-wagging" car, which made progress neither pleasant for the passenger nor good for the service.

Mr. A. NORTON said that in his experience "jazzing" arose when tires on the same axle were run at varying diameters. In some cases he found as much as ¼ in. difference between the one wheel and the other. Such a thing was bound to cause corrugations by the jumping and slipping which ensued. On many systems the tires were allowed to run through their life without being touched in any way, with the result that the profile of the tire was entirely lost, one flange creeping to the centre of the tire, while the other flange was almost obliterated.

Mr. A. W. A. CHIVERS advocated the employment of a harder rail at the offset. He had been one of those who had considered that question on the Joint Committee of the Association and the Municipal Tramways Association, and it was clearly indicated by the particulars collected that harder rails gave much better results from the point of view of wear and from that of immunity to corrugation. Rails much harder than the British standard specification demanded had been used to a large extent in this country, and comparisons which had been made showed conclusively that there was much to be said in their favour.

Mr. W. V. EDWARDS thought that the "jazzing" was probably due to difference in wheel diameters. On a portion of his own track for seven years some cars were fitted with petrol generating sets, which were placed under the staircase at one end of the car, and it was found that those cars "jazzed" tremendously; on examination it was shown that the car wheel nearest the heavy generating set was much smaller than the others, and when a wheel was put in under that heavily-loaded corner ¾ in. greater than the corresponding wheel of the same axle, the difficulty was overcome.

Mr. RICHARD HUMPHRIES considered that, while they were all hoping for great things from *in situ* hardening, the best thing to do was to get the original angle of inclination altered. His own experience was that both wheels and rails rapidly got down to 1 in 12, and he wished that the British Standards Committee would reconsider its regulation of 1 in 21, because he had never found a system on which 1 in 21 was maintained after any considerable period of running.

Mr. R. G. CUNLIFFE expressed the view that there was no steel, however hard, which would prevent the appearance ultimately of corrugations. In cases in which it was stated that there had been a cure as the result of a rail-hardening process the probability was that there had not been time for the corrugations to develop.

Mr. I. BULFIN, in his reply, said that on one particular line in Bournemouth they had a very hard steel rail, and they never had a single corrugation on that line, but its disadvantage was excessive brittleness. He believed that the absence of corrugation was the result of the hardness of the rail. With regard to the profile of the rail, he always liked to let the rail wear down as much as possible before beginning hardening. In specifying an angle of 1 in 21 he thought that the British Standards Committee had in mind other traffic on the road, the wheels of which might catch in a tram-line of different profile.

Annual Report.

The ordinary general meeting was held at the Town Hall, Bournemouth, on June 23rd, when the Council submitted its report and the statement of accounts for the year ended December 31st, 1921, which showed that the revenue for that period amounted to £794, and the expenditure totalled £769.

In moving the adoption of the report of the Council, Mr. C. G. TEGETMEIER, who presided, referred in particular to the work done by the several special committees of the Association, among them the committee which had in hand the question of annual allowances for income tax purposes in respect of wear and tear of tramway permanent way. This committee had acted in collaboration with representatives of the Municipal Tramways Association and the Institute of Municipal Treasurers and Accountants, and after many interviews with officials of the Board of Inland Revenue a revised scheme had been issued by the Board, the gist of which was that repairs would be allowed as an expense of the year in which they were carried out, while the actual cost of renewals would be allowed over an agreed period. The scheme did not provide any relief in respect of assessments prior to 1920, but for the future it would be more beneficial to the tramway industry than the former arrangement, dating from 1909, which provided for the allowance for repairs being fixed for five years on the basis of the average annual expenditure for the three years preceding the date of revision. The chairman went on to deal with the parliamentary activities of the Association, referring first to the Tramways (Increase of Charges) Act, 1920. Deputations from the Association and the Municipal Tramways Association had waited upon the Ministry of Transport with a view to the extension of the period of the Act or to the obtaining of some assurance which would avoid the necessity of the undertakings spending their money, time and energy on the promotion of Private Bill legislation. Subsequently, an official intimation was received from the Ministry to the effect that the Government had decided, unless the question was otherwise dealt with by Parliament, to introduce legislation to extend the operation of the Act until February 15th, 1924. All that could now be done was to await the further action of the Government. He also referred to the question of unemployment insurance, which constituted a very heavy tax upon the tramway industry. He believed that the industry contributed a sum of not less than a quarter of a million a year in excess of what was disbursed among its own unemployed. The suggestion was now being discussed that the industry should attempt to set up its own unemployment insurance scheme: from the financial aspect the suggestion was very attractive, but the organisation and administration of the scheme would, he feared, present many difficulties. The Chairman then touched upon labour questions, especially the sliding scale agreement, which was adopted by the Joint Industrial Council in June, 1921. Owing to the construction of the scale the wages of tramway motormen and conductors had not fallen to the same extent as the wages of skilled men, including railwaymen, and if the present rate of progress was continued the wages of skilled men were likely to fall below those of motormen and conductors. The two sections of employers represented on the Joint Industrial Council—the companies and the municipalities—had decided that the time was opportune to give the necessary three months' notice to terminate the agreement, and it was hoped that a new agreement would be negotiated in the interval. The agreement made in March, 1919, fixing the conditions of service in the industry, had been revised since the last meeting; the new agreement, which became operative in April last, probably left much to be desired, but he believed everyone would agree that it was a very great improvement upon the rigid conditions of the old one.

Mr. R. J. HOWLEY, in seconding the adoption of the report, said that they all felt a little nervous that the Parliamentary session should have gone so far without direct action by the Minister with regard to the extension of the period of operation of the Tramways (Increase of Charges) Act. It would be most unfortunate if any default took place. He was glad to say that the Association and the municipal body had been able to work very well together on the revision of the agreement covering the conditions of labour, and the consideration of the sliding scale of wages, and what had been done during the past year was a good augury for happy relations in years to come.

The report was adopted.

CRYSTAL STRUCTURE AS DETERMINED BY X-RAY ANALYSIS.

It will be remembered that at the Royal Society's annual soirées on May 17th and June 20th, Sir W. H. Bragg, F.R.S., Professor of Physics at the University of London, and Prof. W. L. Bragg, F.R.S., who fills a similar capacity at the University of Manchester, exhibited an exceedingly interesting collection of models of crystal structure as determined by X-ray analysis. The methods employed make it possible to construct models which show with great accuracy the size of the cell containing the unit of pattern of the crystal. In some simple cases the positions of the atoms in the cell are known with equal precision; in others the approximate positions can be inferred. The distance between the centres of two neighbouring atoms is generally known with much more accuracy than the radius of either. The models of organic crystals are based on the principle, which seems to be justified by success, that the benzene and naphthalene molecules are actual frameworks of definite dimensions. The scale of most of the models exhibited was 100,000,000 to 1.

When the material to be examined cannot be obtained in a crystalline form, it is possible to use it in the shape of powder; X-rays are passed through the powdered substance, and thus spectral lines are produced from which the characteristics of the material can be deduced. This method of analysis is described in the original papers of Debye and Sherrer* and of Hull†, and has been applied to a number of substances with great success. Every crystal, no matter how finely it can be powdered, gives its characteristic spectrum, and the method is found of extreme value in the examination of the crystalline structure of materials. The vast majority of solid substances are crystalline, and their properties, *i.e.*, tensile strength, rigidity, and so on, are closely connected with the state of crystallisation. Applications of this form of analysis to the study of pure science are already very numerous; for example, in the elucidation of the crystal structure of a large number of substances which do not show crystal structure sufficiently well formed to be examined in other ways.

A New X-ray Tube.—For the purpose of obtaining X-ray photographs of crystalline structure by the powdered-crystal method in the Physical Laboratory of University College, London, the X-ray bulb illustrated in fig. 1 was devised.** The bulb exhibited at the Royal Society's soirées produces soft rays; it has a water-cooled copper anticathode, and is generally run at a pressure of 30,000 volts. The wave-lengths emitted by it are 1.54 A.U. (strong) and 1.42 A. U. (weak), and with a current of three milliamperes a useful photograph is obtained in three hours, in the case of substances of moderate density.

The principle is not new; various workers have employed apparatus of similar design, notably Siegbahn at Lund in Sweden,‡ and Muller at the Cavendish Laboratory at Cambridge‖, but the feature of the tube outlined in fig. 1 is that it has been found useful for obtaining photographs easily and quickly, at any rate in cases where no very heavy atoms are contained in the material to be photographed. Photographs of naphthalene (top) and phthalic acid (bottom) obtained with this tube, with an expenditure of only 10 milliampere-hours, are reproduced in fig. 2, and it may be pointed out that each line in these X-ray photographs shows the existence of reflection by a certain plane in the crystal,

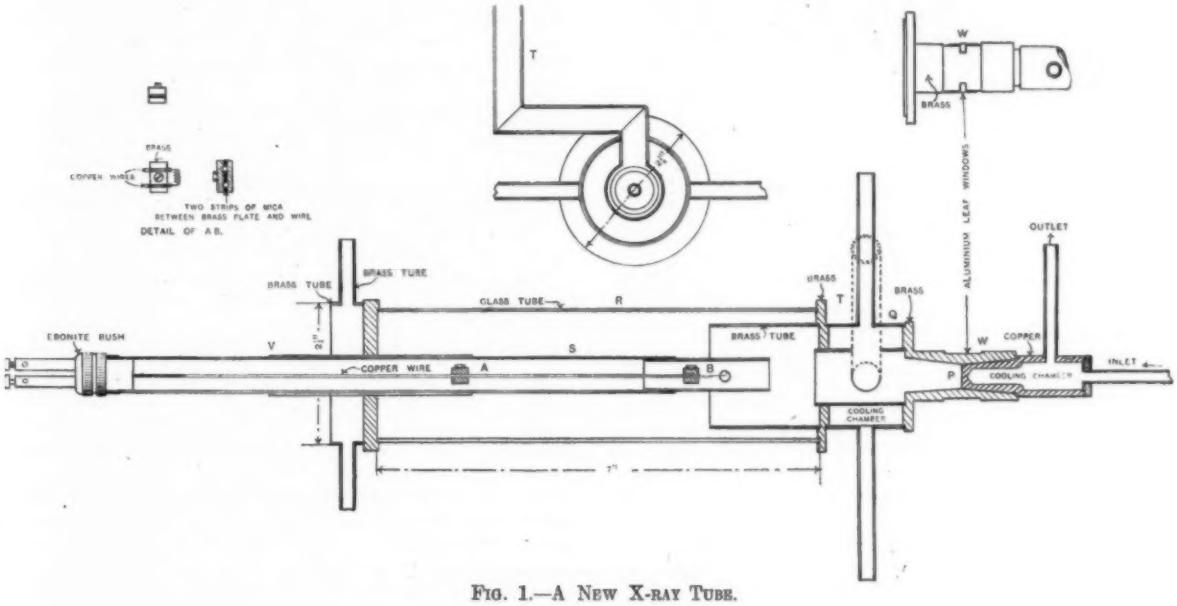


FIG. 1.—A NEW X-RAY TUBE.

not as ordinary spectra do, the existence of a particular frequency in the incident light.

The discharge takes place in the right-hand end of the tube, as shown in the diagram; the whole of this end is made of metal and all exterior parts are earth connected. The anticathode P is made of copper, or any other metal, according to the wave-length of X-rays required, and both the anticathode and the brass cylinder Q are cooled by running water. The glass tube R serves to insulate the cathode system from the anticathode; at its left-hand end is a brass water chamber whose inlet and outlet pipes are connected to an insulated water reservoir placed above the level of the tube. The water circulates by reason of the convection currents, and thus this end of the tube is kept cool. A brass tube S passes through the water chamber and carries the leads to the tungsten filament, which, when heated to incandescence, produces the electrons on which the action of the tube depends. Sliding in S is another short length of tubing, and by adjusting the distance of the

* *Physikalische Zeitschrift*, 17, 277, 1916.
† *Physical Review*, Jan. and Dec., 1917.

** By Mr. G. Shearer, working for the Department of Scientific and Industrial Research.
‡ *Phil. Mag.*, June, 1919.
‖ *Phil. Mag.*, Sept., 1921.

end of the latter tube from the filament the degree of focus can be controlled. The distance of the filament from the anticathode can be altered by sliding the tube s in or out. Under working conditions the distance is from one to one and a half inches, and not as shown in the diagram, where the tube is shown drawn back to avoid confusion. The tube is exhausted to a very high vacuum through the tube T, shown as a broken line in the main diagram and in detail above. All glass-metal joints are made with sealing-wax, as are also any joints which may require to be broken; for example, by heating the joint at v the tube carrying the filament can be removed and a new filament fitted. The rays emerge through two thin aluminium windows w, one on each side of the tube, so that two substances may be examined simultaneously.

Crystal Structure of Steel.—A very good example of the application of the above-described method of analysis to the problems of industrial science was given by Dr.

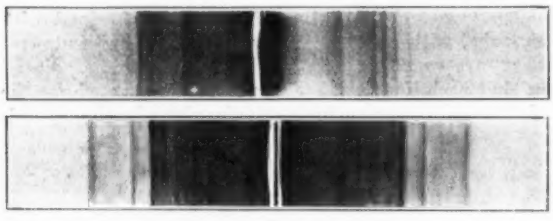


FIG. 2.—X-RAY PHOTOGRAPHS: NAPHTHALENE (TOP) AND PHTHALIC ACID (BOTTOM).

Arne Westgren and Gösta Phragmen, of Stockholm, Sweden, in the paper they read at the Iron and Steel Institute's May meeting.

The authors have carried on the X-ray crystallographic investigations on iron and steel (which formed the subject of a report by one of the authors at last year's annual meeting of the Institute) with improved experimental arrangements, and have obtained photograms clear enough for reproduction. A reconstruction of the camera for exposures at high temperature has enabled them to let the glowing iron wire rotate during the X-ray illumination. They have thus obtained not only a very distinct line photogram of γ-iron (1,100° C.), but also succeeded in determining the structure of δ-iron (1,425° C.). They have been able to ascertain the deforming influence of dissolved carbon on the γ-iron lattice in austenite. A combination of the Debye-Scherrer method with the X-ray analytic procedure of Laue, and the investigation of the X-ray reflections of a rotating crystal, have finally made it possible to determine the crystal shape and the elementary volume of cementite.

The X-rays were produced in a tube of the Siegbahn type. It has sometimes been difficult to get the metal body of those tubes, when made of bronze, quite vacuum tight. Another material was therefore tried, extremely free from all kinds of slag inclusions and heterogeneities, and therefore quite satisfactory, namely, S.K.F. ball-bearing steel. It completely responded to expectations.

The anticathode was cut off perpendicularly to its axis, and in order to get the characteristic X-rays of iron, very convenient for these investigations, an iron plate was soldered on to it. Round the radiating anticathode surface five windows were made so that the tube gave five beams and exposures could be made in five cameras simultaneously.

The tube was evacuated through an aggregate of a mercury vapour jet pump and a mercury diffusion pump of the Volmer type. In front of the jet pump a glass bottle of about 10 litres content was introduced and was exhausted together with the pumps and the tube, to a pressure of about three millimetres of mercury. If the system proved tight this primitive vacuum could be kept up for any length of time. When the pumps had been at full work a few minutes the pressure in the tube had decreased so much, that at the voltage used (maximum effective voltage, 50,000 volts) no current could pass. A capillary glass tube of about 0.5 metre length and 0.2 millimetre width was connected with the tube on the side opposite to the exhaust opening. This tube was connected with a glass bottle containing air, the pressure of which could be regulated, and thus the pressure in the X-ray tube could be kept constant at any state, and the tube could thus be run at any voltage desired. It was usually charged at from 45,000 to 50,000 volts and run with from 10 to 12 milliamperes.

In summarising the results obtained by the authors it may be said that X-ray photograms (according to Debye and Scherrer) of an iron wire, heated to 800°, 1,100°, and 1,425° C. have shown that the iron within the so-called β- and δ-ranges has a body-centred cubic structure and within the γ-range a face-centred cubic structure. The strange fact is thus proved that the transformation that takes place at 900° C. (A3) is reversed at 1,400° C. (A4).

The γ-iron lattice of austenite steels is enlarged by the dissolved carbon. A steel with 1.98 per cent. carbon has been found to have a somewhat larger lattice when quenched from 1,100° C. than when quenched from 1,000° C. Also the α-iron lattice in martensite seems to be influenced by the carbon present.

The ranges of homogeneous α-iron lattice in martensite have proved to be extremely small. It has been stated that a steel with 0.80 per cent. carbon, quenched in water from 760° C., is on the verge of being totally amorphous.

Debye photograms of cementite and of the well-known crystal tablets of spiegel iron have been found to be identical. A Laue photograph and investigations of an orientated rotating crystal of the latter type have made it possible to find the crystal data of cementite. It belongs to the orthorhombic system, its ratio of axis is 0.670 : 0.755 : 1, and the dimensions of its elementary parallelepiped are 4.53, 5.11, and 6.77 A.U. The base group consists of four molecules Fe_3C, which corresponds to a specific weight of 7.62 for the cementite.

The Board of the Stockholms Högskola and Ingeniörsvetenskapsakademien in Stockholm granted the sums necessary for an X-ray installation, without which these investigations would have been impossible.

THE WORLD POWER CONFERENCE OF 1924.

Two or three years ago in one of the many reports that were prepared regarding the water-power resources of the British Empire, a proposition was made that a conference should be held at an early date in London of delegates representing the various countries which were interesting themselves in the hydro-electric utilisation of natural forces which were running to waste within their boundaries. Though such conference did not take place, a great deal of preliminary work has been carried out in various parts of the world which will eventually yield practical results and much statistical information has been compiled.

In the last report of the annual meeting of the British Electrical and Allied Manufacturers' Association (ELEC. REV., March 31st and April 7th, 1922) the proposal assumed a more comprehensive character. It was announced by the then chairman, Mr. W. O. Smith, that the Director of the B.E.A.M.A. brought before the Council last autumn a scheme which he designated "The World Power Conference," the object of which was to bring together, in London, experts from all parts of the world to discuss the important subject of "power" in its many aspects. After consideration, the Council authorised Mr. Dunlop to promote the conference. The British Empire Exhibition (Wembley, 1924) authorities have agreed to the use of the Conference Hall free of charge and to promote certain entertainments for guests from other countries.

We have now received from Mr. D. N. Dunlop, who is acting as Organising Director of the Conference, certain preliminary literature regarding the arrangements. In these publications it is explained that the object of the

conference (of which the Earl of Derby is the President) will be to consider how the industrial and scientific sources of power may be adjusted nationally and internationally:—

By considering the potential resources of each country in hydro-electric power, oil, and minerals.

By comparing experiences in the development of scientific agriculture, irrigation, and transportation, by land, air, and water.

By conferences of civil, electrical, mechanical, marine, and mining engineers, technical experts, and authorities on scientific and industrial research.

By consultations of the consumers of power and the manufacturers of the instruments of production.

By conferences on technical education to review the methods of education in different countries, and to consider means by which existing facilities may be improved.

By discussions on the financial and economic aspects of industry nationally and internationally.

By conferences on the possibility of establishing a permanent world bureau for the collection of data, the preparation of inventories of the world's resources, and the exchange of industrial and scientific information through appointed representatives in the various countries.

A booklet has been prepared in several languages setting forth the scheme, and this also contains names of the Vice-presidents and Grand Council and of the Scientific and Technical Board. The Executive Committee will be composed of members of the Council of the B.E.A.M.A., an Advisory Committee of co-operating bodies, representatives of Government Departments, and representatives of the Dominion Governments. The proposed sections of the Conference are as under:—

I. Power Resources. 1. Chemistry; 2. Physics; 3. Research (Research Associations); 4. Raw materials.

II. Power Development. 1. Engineering: Civil, electrical, marine, mechanical, mining. 2. Transport: Land, water, air. 3. Education: Classical, technical, and scientific. 4. Health: Physical and psychological. 5. Publicity.

III. Power Applications. 1. Agriculture; 2. Industry; 3. General utility.

IV. Power: Economic and Financial. 1. Credit: National and international; 2. Currency and exchange; 3. Exports and imports.

We understand that the list of "Representatives of Dominion Governments" is nearly complete, and negotiations are in progress for the formation of Councils and Executive Committees in the Dominions, with which the Home Executive will co-operate. Arrangements are also in progress for the formation of similar bodies in the following countries:—The United States, France, Italy, Spain, Switzerland, Scandinavia, and the Netherlands. The co-operation of technical and scientific institutions and industrial organisations in this and other countries is being secured, and further particulars will be available later.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS FOR MAY, 1922.

The May figures, as compiled from the official returns, for the exports of electrical goods and machinery of £849,017, show a reduction in values of £195,000 as compared with the totals for April of £1,044,580, the principal falling off occurring in the item for electrical machinery (£163,000 decrease), whilst lower values were also recorded in the items for insulated wire and cable (£2,000 decrease), glow lamps (£7,000 decrease), meters and instruments (£8,000 decrease), and telegraph and telephone cable and apparatus (£21,000 decrease). Increased values were registered in the sections for electrical goods and apparatus, batteries and accumulators, carbons and arc lamps and parts. The returns of electrical imports were £207,155, as compared with £169,497 for the previous month, an increase of £37,000, the figures for electrical machinery imports showing an appreciation of £30,000.

The re-export total of electrical goods and machinery for the month at £17,769 was £19,000 down on the April figures, the large total for that month being due to the re-export of glow lamps to the value of £25,000, whilst for the month under review £1,100 only was recorded in that section.

Values of Electrical Exports and Imports for May, 1922.

	Exports.	Imports.	Re-exports.
	£	£	£
Electrical goods and apparatus ...	92,141	40,977	6,602
Insulated wires and cables ...	114,061	15,298	—
Glow lamps	32,730	10,748	—
Arc lamps and parts	2,537	670	1,100
Batteries and accumulators ...	47,037	5,972	589
Meters and instruments	20,583	8,862	1,085
Carbons	4,889	4,010	119
Electrical Machinery—			
Railway and tramway motors ...	9,031	—	—
Other motors and generators ...	153,872	—	—
Switchboards (not telegraph or telephone)	8,251	—	—
Electrical machinery (unenumerated	133,384	98,991	4,449
Telegraph and telephone cable and material—			
Telegraph and telephone wire and cable (not submarine)	43,172	2,675	15
Submarine telegraph and telephone cable	25,765	—	—
Telegraph and telephone instruments and apparatus	161,564	18,952	3,148
Totals ...	£849,017	£207,155	£17,769

BUSINESS NOTES.

The "Electrical Review" Index.—The Index to Vol. XC. of the Electrical Review, which will shortly be printed, will be supplied only to those who through the post specially apply for it. To them it will be supplied for 6d. post free. Any reader or advertiser, at home or abroad, who requires a copy for binding, or for other purposes, is asked to make early application therefor to the Publisher, Electrical Review, 4, Ludgate Hill, E.C.4.

Bankruptcy Proceedings.—The Vulco Magneto Co. (Herbert Rothwell, Stanley James Watson, and Frank Cecil Jinks, trading as electrical and mechanical engineers), 11, Long Acre, W.C.—A sitting of the London Bankruptcy Court was held on June 20th before Mr. Registrar Mellor for the public examination of these debtors, whose joint accounts showed liabilities £2,076 and assets nil. The debtor Watson was not in attendance, and his examination was adjourned for a week, but the debtors Rothwell and Jinks were allowed to pass. According to the observations of Mr. Walter Boyle, it appears from the statements of the debtor Rothwell that in January, 1918, he and another person commenced at No. 11, Long Acre, W.C., an electrical and mechanical engineering business, and carried it on under the style of the "Vulco Magneto Co."; in November, 1918, his partner retired and was eventually repaid his capital (agreed at £1,246) in the business. He then (November, 1918) took into partnership the debtor Stanley James Watson, who provided £700, of which £350 was treated as a personal loan to himself (Rothwell). In May, 1919, they were joined by the debtor Frank Cecil Jinks, who paid £800 for a one-third share in the business, and under the articles of partnership he was deemed to have become a partner on November 20th, 1918, when Watson's connection with the business began. The business was continued at No. 11, Long Acre, W.C., under the same style, "Vulco Magneto Co." The first year's trading to November 30th, 1919, produced a small profit, but thereafter the business was carried on at a loss. In October, 1920, Jinks severed his connection with the business, and Watson (who had a separate but similar business of his own) expressed his inability to put up further capital, and the partnership thereupon, for all practical purposes, came to an end, although no formal dissolution took place. After October, 1920, he (Rothwell) transacted, but in the name of the firm, what business was done; he was, however, mainly engaged in realising the firm's assets. He received altogether about £1,258 (including £100 from the debtor Jinks), which was expended on purposes connected with the business, including the payment of debts of the Vulco Magneto Co., which were substantially reduced. After the realisation of the aforesaid assets, which had been disposed of by the end of January, 1921, a creditor, who had obtained judgment against the firm for damages for breach of contract, presented the petition on which the receiving order was made. Rothwell attributes the failure and insolvency of the Vulco Magneto Co. (1) to lack of working capital to pay wages and other outgoings; (2) to the firm's inability as a consequence, and also by reason of the non-delivery by a contractor of necessary parts, to complete certain work on hand, as a result of which there

was a heavy loss in trading; and (3) to liabilities for breaches of contracts and law costs in connection therewith.

The debtor Watson has lodged a statement of his separate affairs, showing total liabilities £34,775 (unsecured £10,317) and net assets valued at £2,793, after allowing £48 for payment of the preferential claims.

The Official Receiver's observations upon the debtor's history show that prior to May, 1910, he was for a number of years in the service of a motor industries company. In May, 1910, he was appointed sole representative and agent in the United Kingdom for a German company carrying on, at Stuttgart, the business of manufacturers of electric parts, magnetos, &c., and in connection therewith, took premises at No. 43, Berners Street, Oxford Street, W., where he traded on behalf, and in the name of, the company, which contributed to establishment charges and paid him a commission on sales effected. On the outbreak of the European war he assumed the proprietorship of the business, removing the German trading name and substituting therefor his own. After summarising his subsequent operations down to 1921, the Official Receiver says that the debtor attributes his separate failure and insolvency (1) to the slump in the motor and engineering trade after the spring of 1920; (2) to the adverse rates of exchange between this country and the United States of America from the end of 1919 to the end of 1920, and consequent loss in connection with his trading in motor cars and cycles before referred to; (3) to lack of capital and consequent heavy interest and bank charges; (4) to heavy law costs and pressure by a large creditor and forced sale of the plant and effects before referred to, which brought his business virtually to a standstill; and (5) to lack of profits to meet his household and personal expenditure.

J. F. Ludlow and R. R. Ludlow (Ludlow Bros.), electrical contractors, 196, Church Road, Redfield, Bristol.—Last day for proofs for dividend July 8th. Trustee: Mr. F. W. Darley, Official Receiver, 36, Baldwin Street, Bristol.

R. H. Liddell (Liddell & McInnes), electrical engineer, 4, The Crescent, Carlisle.—Last day for proofs for dividend July 14th. Trustee: Mr. K. J. Hough, 34, Fisher Street, Carlisle.

J. M. C. Hampshire, colliery electrician, 91, Doncaster Road, Goldthorpe, Rotherham.—Receiving order made January 19th on debtor's own petition.—First meeting, July 5th, at the Official Receiver's offices, Sheffield; public examination, July 20th, at the County Court Hall, Sheffield.

F. J. Gill, electrical engineer, 26, Hardwick Street, Buxton.—Receiving order made June 19th on debtor's own petition.

T. G. Coaton (T. G. Coaton & Co.), electrical engineer, 16, Humberstone Road, Leicester.—Trustee: Mr. E. H. Hawkins, 4, Charterhouse Square, E.C., appointed June 22nd.

F. C. Goss, electrical engineer, 32, Windsor Road, Bishopston, Bristol.—First and final dividend of 2s. 6¾d. in the £, payable June 30th at the Official Receiver's office, Bristol.

L. R. Henson, electrical engineer, 23, Green Lanes, London.—Receiving order made June 23rd on debtor's own petition. First meeting, July 6th; public examination, July 28th; both at Carey Street, W.C.

Wyness & Bate, electrical engineers, 13, Commercial Street, Brighouse, York.—Receiving order made June 23rd on creditor's petition.

Company Liquidations.—W. Watkin & Son, Ltd., 181, Queen Victoria Street, London, E.C., electrical engineers, &c.—Pursuant to Section 188 of the Companies (Consolidation) Act, a meeting of the creditors of the above was held on June 20th at Anderton's Hotel, London, E.C., when Mr. A. E. Quaife, of 155, Fenchurch Street, E.C., the liquidator of the company under the voluntary liquidation, presided. It may be recalled that a meeting of the principal creditors was held prior to the company meeting to wind up, when Mr. Quaife was nominated as the liquidator, and a committee was also appointed, consisting of Messrs. Ashby & Sons, Messrs. Grimwood & Co., Messrs. H. P. Smith, Ltd., the National Radiator Co., and Woodworkers, Ltd.

At the meeting on the 20th inst. Mr. Quaife reminded the creditors of the purposes of that conference, which were, he said, practically limited to either the ratification of himself as liquidator or the appointment of some other liquidator in his place. He desired, however, to give the creditors some information with regard to the present position, and he might inform them that this company had taken a somewhat unusual course in consulting the principal creditors before calling the shareholders together for the purpose of going into voluntary liquidation. At that preliminary conference it was pointed out that the company was in a hopeless position financially, and that the only course to pursue would be to voluntarily liquidate. He (Mr. Quaife) was thereupon nominated for the position of liquidator, and a committee, as mentioned above, was also appointed to confer with him with regard to the liquidation. Subsequently the shareholders met and duly ratified his appointment, and it was now for the general body of creditors to adopt a similar course. It would appear that something like 75 per cent. of the liabilities had been represented at that preliminary meeting, and it was obvious, therefore, that the first conference was in every way a representative one so far as the unsecured liabilities were concerned. There was a tremendous amount of detail to be gone into with regard to the affairs of the company, and if had been impossible to get out this information in the time that had been at his disposal. He might inform the creditors, however, that an approximate statement of affairs presented at the preliminary conference showed that there were unsecured liabilities amounting to £10,903, while a partly-secured creditor claimed £765 17s. 8d. This creditor was the bank, who held a charge on certain contracts which were valued at the same amount. With regard to this particular contract, it concerned an electrical job at Aldershot. He (the liquidator) had been going into the figures, and it was difficult to see how this job would work out, but the architect had recommended a payment of between £500 and £600 on account of the contracts, and the War Office, for whom the work was undertaken, had refused to pay a penny, because of the unsatisfactory nature of the work. Dealing with the assets, Mr. Quaife said that they consisted of cash in hand and at bank, £221; stock-in-trade, £935; deposits, &c., £60; trade accounts, £1,623; and other items which brought up the total assets to about £5,000. With regard to certain uncompleted jobs, he mentioned that one of these jobs concerned three contracts at Welwyn for the erection of 28 houses, and the contract price was £30,000. There was said to be a balance on that job of between £300 and £400. There was a contract for six other houses at Welwyn, where there was an estimated balance of £466, and yet another contract concerning the erection of a bungalow at Totteridge, and there was the Aldershot contract to which he had already referred. Certain work had also been undertaken at Eltham and Woolwich. With regard to the assets he had mentioned, he thought that if they produced in all something like £1,500, or at the very outside £2,000, it was as much as the creditors could expect to receive in the course of the realisation. Practically the whole of the deficiency was represented in the Welwyn contract, and when the directors entered into these contracts they ought to have known that they must prove unsuccessful.

The company was registered on April 12th, 1921, with a nominal capital of £5,000, and the directors were Mr. Sandiford, Mr. Munro, Mr. Bearfoot, Mr. Lewis, and Mr. H. C. Wood. The object of the company was to take over the business of engineers which had been carried on by Mr. Sandiford. The misfortunes of the company seemed to have grown out of the fact that the business, which was originally connected with electrical and general engineering, &c., was extended to embrace building, and the unfortunate part was that this latter branch of the business was not sufficiently understood to enable the directors to cope with the contracts which were undertaken, with any hope of success.

Following the explanation of Mr. Quaife, a discussion ensued, in the course of which the liquidator stated that it was not intended that the business should be in any way continued.

After some further discussion it was decided to ratify the appointment of Mr. Quaife as liquidator, and the same committee of inspection was also approved. The following are creditors:—

	£		£
Alden Engine Co.	179	Kitson (J. W.) & Co., Ltd. ...	28
W. Ashby & Son	331	H. Lane & Co., Ltd.	86
Beeston Foundry Co., Ltd. ...	293	London Galvanised Iron Co., Ltd.	135
Baxter & Caunter, Ltd. ...	108	Lyle-Barrs & Co., Ltd. ...	40
Butterfield, H.	257	Meadows, E	19
Henry Brown & Sons	190	Morgan & Son, Ltd.	72
Brown, W.	14	McDowall, Steven & Co., Ltd.	15
Best & Lloyd, Ltd.	33	Mayo, Frank S., Ltd.	148
John Bolding & Son, Ltd. ...	12	Munzing, H., Ltd.	47
Barnes, F.	62	Frederick A. Clark & Son ...	10
Credenda Conduits Co., Ltd. ...	320	Metal & Hardware Products, Ltd.	21
Crow (W. R.) & Son	126	Nettlefold & Sons, Ltd. ...	68
Clarke, H.	28	Newcombe, E. A.	13
Coalbrookdale Co., Ltd. ...	10	Norman, Pearson & Co. ...	41
Cayless Bros.	88	National Radiator Co., Ltd. ...	637
Director of Building Materials Supply	113	Fenwick J. Owen & Son ...	173
Davis Gas Stove Co., Ltd. ...	30	Petty, W.	14
Elsley Thomas, Ltd.	10	Pryke & Palmer	14
Earl & Matthews	79	Parkinson Stove Co., Ltd. ...	13
Ellis & Ellis	25	Rogers & Overton	97
Farmiloe (Geo.) & Sons, Ltd. ...	149	Shanks & Co., Ltd.	12
Fryer, H.	16	Smith, H. P., Ltd.	357
Farmer, Stedall & Co. ...	10	Smith, Alfred	20
Fell, Anderson & Co., Ltd. ...	316	Standard Range & Foundry Co., Ltd.	227
Falkirk Iron Co., Ltd.	47	Sharman, P. R.	244
Fletcher, Russell & Co.	60	Steingold, J. & M.	30
General Iron Foundry Co., Ltd.	83	Stoneham & Madgwick ...	27
Grimwood & de Geus, Ltd. ...	520	Sutcliffe Bros.	28
Great Northern Railway Co. ...	63	Swanpool Housing Society ...	225
General Electric Co., Ltd. ...	91	Trollope & Colls, Ltd.	170
James Gibbins, Ltd.	34	Teale Fireplace Co., Ltd. ...	18
Grover & Sons	30	Timbertown Brickworks, Ltd. ...	161
Gale, W. G.	11	Todd (W. R.) & Son, Ltd. ...	23
Henley's (W. T.) Telegraph Works Co., Ltd.	46	United Brassfounders & Engineers, Ltd.	24
Hall & Hall	18	Wood, Russell & Co.	22
Hales Clinkers, Ltd.	75	Watshams	105
Howells & Co.	78	Weiner, J., Ltd.	16
Hooper & Ashby, Ltd.	27	Woodworkers, Ltd.	1,250
Hall & Bartholomew, Ltd. ...	19	Woodman, G.	130
Hennell & James	50	Welwyn Builders & Joiners, Ltd.	198
Heywood & Bryett, Ltd. ...	306	Welwyn Transport, Ltd. ...	241
Ingram, Perkins & Co., Ltd. ...	23	Welwyn Garden City, Ltd. ...	181
Jones, Lock & Co., Ltd. ...	12	Welwyn Restaurants, Ltd. ...	131
Kartret Eng. Co., Ltd.	433		

Portarlington Electric Light & Power Co., Ltd.—A petition for the winding-up has been presented to the High Court by Mr. P. J. Weymes, a shareholder, of Mullingar, Co. Westmeath, and will be heard in London on July 4th.

J. E. Slack, Ltd.—A petition for the winding-up, subject to supervision of the Court, has been presented to the High Court by the Wednesbury Tube Co., Ltd. (creditors), and will be heard in London on July 4th.

S. GILLITT & Co., LTD.—First meetings of creditors and contributories July 5th, at the Official Receiver's office, Pearl Buildings, 4, Northumberland Street, Newcastle-on-Tyne.

R. J. RODD, LTD.—A petition for the winding up has been presented to the County Court of Surrey by the Taw Manufacturing Co., Ltd., of Hornsey, and will be heard at Kingston on July 21st.

A. CHASE & Co., LTD.—Winding up voluntarily. Liquidator: Mr. A. M. Cole, Fairfax Road, Teddington.

J. H. HOBBS & Co., LTD.—Winding up voluntarily. Liquidator: Mr. C. T. Appleby, 26, Corporation Street, Birmingham. Meeting of creditors, July 3rd, at the Grand Hotel, Birmingham.

Dissolution of Partnership.—E. E. CLARKE & Co., electrical engineers and contractors, Alhambra Buildings, Morecambe.—Mr. J. H. Barraclough and Mr. E. E. Clarke have dissolved partnership. Mr. Clarke will attend to debts and continue the business.

Receivers Appointed.—BROTHERTON EDISWAN TUBES & CONDUITS, LTD.—R. H. Johnston, of 49, Queen Street, Wolverhampton, was appointed receiver and manager on June 14th, 1922, under powers contained in debentures dated April 7th, 1921.

ALBERT LEE & Co., LTD., LONDON.—Mr. F. C. Harper, 27, Chancery Lane, London, W.C.2, has been appointed receiver on behalf of the debenture-holders.

Trade Announcements.—MR. C. F. JOSEPH has removed from Beak Street to 55, Berners Street, Oxford Street, London, W.1. Telephone: "Museum 1928."

The Birmingham sales office of CALLENDER'S CABLE & CONSTRUCTION CO., LTD., is now at Daimler House, Paradise Street, Birmingham, and the company's representative at that office is Mr. J. M. Dunkeley.

MESSRS. CROW, TOOGOOD & Co. are removing to 56, High Street, Charing Cross Road, London, W.C., where they have a display of alabaster and electric light fittings.

MESSRS. R. H. BARKER & Co., engineers, have removed to Helmshore, near Manchester.

MESSRS. COOPER & KING, LTD., have removed to 17, Castle Street, Cardiff.

MESSRS. F. W. PARKES & Co. have removed to Faraday House, Temple Lane, Dame Street, Dublin.

THE WALSALL HARDWARE MANUFACTURING CO., LTD., informs us that Mr. D. G. Brooks relinquishes his connection with the company as from to-day, June 30th, and that all correspondence for it should be sent direct to the head office at Hatherton Works, Walsall, instead of to Birmingham.

Catalogues and Lists.—MESSRS. FROST BROS., 26, Little Park Street, Coventry.—An illustrated pamphlet dealing with the "Rotameter" for measuring the air consumption of pneumatic tools.

MR. H. B. TURNER, 79, Playford Road, N.4.—Three illustrated and priced leaflets dealing respectively with small voltmeters and ammeters, "Elect" kettles, and "Elect" irons.

THE SOLENOID REGULATOR CO., Highgate Square, Camp Hill, Birmingham.—An illustrated and priced leaflet of drum-type star-delta and series-parallel switches.

THE IMPERIAL LIGHTING CO., 2, 4, and 6, Pocock Street, Blackfriars Road, S.E.—An illustrated pamphlet dealing with the "Fairyland" method of decorative electric lighting.

BRITISH INSULATED & HELSBY CABLES, LTD., Prescot, Lancs.—Pamphlet H.88, describing "Helsby" condensers for power-factor improvement. Illustrated.

ELECTRIC CONTROL, LTD., Hastings House, Norfolk Street, Strand, W.C.2.—An illustrated pamphlet describing "Empire" e.h.p. fuses, which were dealt with in an article in our issue of November 25th, 1921.

THE SKEFCO BALL BEARING CO., LTD., Luton, Beds.—A well-illustrated catalogue of "SKF" mechanical power transmission equipment, including ball bearings, countershafts, hangers, plummer blocks, pedestals, pulleys, &c.

MESSRS. HERBERT MORRIS, LTD., Loughborough, Leicestershire.—List 101, illustrating and describing electric overhead cranes; List 696, dealing with hand-operated overhead runways; List 766, descriptive of retort chargers; and List 830, dealing with tubular shear legs for lifting tackle.

THE MIDLAND ELECTRIC MANUFACTURING CO., LTD., Barford Street, Birmingham.—An illustrated and priced folder dealing with a new type of teak-cased distribution board.

MESSRS. CROW, TOOGOOD & Co., 15, Wardour Mews, D'Arblay Street, Wardour Street, W.1.—Net trade price list, June and July, 1922, of electrical accessories, including accumulators, lighting fittings, flexibles, switches, conduit, &c.

HUMPHRY ELECTRIC CO., 24, Broad Quay, Bristol.—Illustrated leaflets dealing with the "Rubcap" sealing insulator and the "Sparka" sparking-plug tester.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Booklet No. W/T 2,775, giving a brief account of the plans of the G.E.C. Wireless Department. Publications Nos. O.S. 2,725, 2,727, 2,742, and 2,743, dealing with "Osglim" neon lamps, and introducing a number of novelties in this direction. Also a show-card of novel design advertising the lamps. Booklet H. 2711, giving reduced prices and illustrations of "Magnet" cooking, heating, and other domestic appliances.

MR. WALTER BALMFORD, "Electric House," Whittall Street, Birmingham.—An illustrated and priced leaflet advertising the "Scot" lampholder.

COMPAGNIE UNIVERSELLE DES TRANSMISSIONS "LENIX," 5, Rue Fenelon, Paris (British agent: Mr. Charles A. Matthews, 47, Whitelow Road, Chorlton-cum-Hardy, Manchester).—An illustrated pamphlet describing the "Lenix" belt drive and applications.

THE CRYPTO ELECTRICAL CO., LTD., Acton Lane, Willesden, N.W.10.—A brochure containing illustrations of the firm's works and products.

THE SUN ELECTRICAL CO., LTD., 118 and 120, Charing Cross Road, W.C.2.—An illustrated booklet giving a description of the "Homelite" small power plant. Priced.

MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Blomfield Street, London Wall, E.C.2.—A showcard in nine colours (15 in. x 10 in.), advertising the merits of the "Henley" wiring system.

MESSRS. ACKROYD & BEST, LTD., Morley, near Leeds.—A series of illustrated leaflets advertising acetylene lamps for mines and quarries, brazing lamps, brass liners, stampings, pressings, machined parts, furnace cement, glassware, &c.

STERLING TELEPHONE & ELECTRIC CO., LTD., 210-212, Tottenham Court Road, W.1.—Publication No. 323, giving particulars of a practice outfit for learning the Morse code. Priced and illustrated.

MESSRS. HOGAN & WARDROP, 88, Golden Lane, London, E.C.1.—Pocket price folder relating to "Draka" v.i.r. wires, cables and flexibles (Holland Insulated Wire & Cable Works, Amsterdam), of which they will carry stocks.

For Sale.—By direction of the Disposal Board, Messrs. Wheatley Kirk, Price & Co., will sell by auction on July 18th and following days, at H.M. Factory, Gretna, Dumfries-shire, boiler-house plant, wood-working machinery, electrical machinery, machine tools, &c. (See our advertisement pages today.)

Book Notices.—"Journal of Scientific Instruments."—We are asked by the Institute of Physics to mention that a great many persons who have received a copy of the preliminary number of the proposed Journal, and who may wish to support it, have not yet filled in the form inserted in the Journal. It is hoped that all who intend to subscribe will inform the Institute without delay so that an estimate may be formed of the support which may be relied upon. It is essential that sufficient support should be forthcoming before it is possible to issue the Journal.

"The *Bulletin* of the Hydro-Electric Power Commission of Ontario," March-April, 1922.—This issue contains a summary of the Commission's reply to the Murray-Flood report criticising its operations. Other articles are a description of the private automatic telephone exchange of the Commission, and notes on the testing of electric water-heating installations.

"The Metropolitan-Vickers Gazette," May, 1922. Price 1s. post free.—This number contains articles on "Power Rectifiers," "Explosion-proof Tests on Induction Motors for use in Mines," "Induction-type Synchronous Motors," and "Metropolitan Railway 1,200-h.p. Electric Locomotives."

"*Journal* of the American Institute of Electrical Engineers." Vol. XLI. No. 6. June, 1922. New York: The Institute. Price $1.

"Catalysis with special reference to newer theories of Chemical Action."—A general discussion held by the Faraday Society. London: The Faraday Society. Price 9s. net.

"*Journal* of the Institution of Engineers (India)." Vol. II. April, 1922; also List of Members. Calcutta: The Institution. Price Rs.50 per annum.

"Science Abstracts" A & B. Vol. XXV. Part 4. No. 292. April 30th, 1922. London: E. & F. N. Spon, Ltd. Price 2s. 6d. each net.

We have received from Oerlikon, Ltd., Oswaldestre House, Norfolk Street, Strand, W.C. 2 (representing in the British Empire the Ateliers de Construction Oerlikon) the first nine issues, from July, 1921, to March, 1922, of the "Bulletin Oerlikon" printed in English. The publication is excellently produced, the illustrations in particular being very clear. The subjects dealt with in the Bulletin include the electrification of the St. Gothard railway, giving detailed descriptions of the plant and equipment, a great part of which was supplied by the Oerlikon Co.; a new method of admitting overload steam used for the Oerlikon turbine; the theory of induction regulation; the new motor coaches on the Burgdorf-Thun railway; and the electric trains of the London & North-Western Railway.

Australia and Swedish Electrical Goods.—An Exchange Telegraph dispatch from Melbourne (dated June 27th), appearing in a financial contemporary, states that "the Tariff Board is considering whether to apply anti-dumping laws in the case of electric motors and other electrical supplies, which are imported from Sweden in considerable quantities and at prices far below those of similar British goods. There is strong suspicion that certain Swedish imports are partly of German origin."

Engineers' War Bonus.—Arrangements are being made for a conference between the Engineering Employers' Federation and representatives of the Amalgamated Engineering Union and kindred unions to discuss the question of the war bonus and the adjustment to existing conditions. It is probable that the conference will take place next week.—*Daily Telegraph.*

Electric Vehicles in Municipal Service.—With reference to the note under the above heading on p. 811 of our June 9th issue, relative to the approximate numbers of each make of vehicle employed in municipal work, we are informed by Messrs. Newton Brothers (Derby), Ltd., that so far as they are concerned the figure quoted is grossly understated. It does not, of course, by any means represent their production of electric vehicles.

Electrical Competition in Turkey.—The May number of the *Journal* of the British Chamber of Commerce of Turkey and the Balkan States contains the following survey of the electrical supplies trade:—"In this line the position is far from satisfactory. The market is flooded with cheap foreign goods, German to a very great extent, and owing to their prices being anything from 30 to 50 per cent. lower than British, there seems to be no room for our goods. Added to this, one must take into account the fact that the standards required by the local authorities are much below British standards, and consequently there is no encouragement to use first-class materials. Cheap installations mean more consumers, and more consumers bigger dividends for the electric company. Much of the electrical trade is in the hands of Jewish firms, and there is a feeling that the leading firms have been cutting prices, with the avowed intention of driving 'outside' firms off the market. Be that as it may, the outlook is far from encouraging from the British manufacturers' point of view, and the British firms in the trade, who have the greater part of their capital tied up in war claims against the Turkish Government, cannot be expected to sustain a price-cutting war with native firms, who have 'made hay while the sun shone.' Shortly after the Armistice a British make of lamp was to be seen in most of the retail shops, and it held its own against Dutch competition for many months. Later, the rise in the exchange and the reduction in price of Dutch and German lamps made further business impossible. There is a large and growing demand in this line, and the British article would certainly be given the preference at the same price. As far as cables are concerned, many orders have been placed in Germany, Czecho-Slovakia, and Italy, the last country getting the majority of orders for cotton-covered flexible. Lately British competition has again made itself felt, and few orders have gone to the United Kingdom."

With regard to the general situation, the survey states:—"Trade always follows capital, and as far as the requirements of the important public utility companies in Constantinople are concerned, British firms are seriously handicapped by the fact that the nationality of these enterprises, as far as their capital is concerned, is either French or Belgian. We need merely mention as examples: Soc. Anon. Ottomane d'Electricité, Soc. des Tramways de Constantinople, La Compagnie des Eaux de Constantinople, La Compagnie des Eaux de Scutari et Kadikeuy, Soc. Imp. Ottomane d'Eclairage par le Gaz et l'Electricité, Soc. Anon. Ottomane des Quais, Docks et Entrepôts de Constantinople, Soc. Anon. Ottomane des Docks et Ateliers du Haut Bosphore (Sténia), Compagnie d'Exploitation des Chemins de Fer Orientaux. Most of these companies buy through their Paris or Brussels offices, and naturally give preference to firms of their own nationality. The only two really important concerns at present in British hands are the Anatolian Railways and the Golden Horn Docks. The former would have most important orders to pass if the political and financial situation were to warrant the expenditure. Let us hope that when Peace is eventually signed British capital will figure in this important concern. In the Smyrna district the Smyrna-Aidin Railway has placed a good many appreciable orders with British manufacturers. The Smyrna market has also given preference to British goods even at somewhat higher prices."

International Road Congress.—It has been decided to hold the fourth International Road Congress at Seville in May, 1923. Representatives from transport and highway associations will attend, and a British committee has been elected to ensure the participation of this country. The committee's address is 15, Dartmouth Street, S.W.1.

Economic Conditions in Sweden.—In the June issue (No. 2) of the *Swedish Economic Review*, compiled by the Swedish Board of Trade and published in the English language, it is stated that the number of workers in the mechanical trade, which was 60,000 on September 1st, 1920, has gradually decreased to 25,200 on April 1st, 1922. "Yet the decline seems to be slackening, and this is in particular noticeable with regard to the number of working hours per week. As compared with the position at the turn of the year the number of unemployed has decreased 7 per cent. and the number of working hours 2 per cent. Some concerns, especially those working on Russian orders, are fully occupied, while in the main part production is running very low. As in all countries the shipyards are practically out of work. Among other mechanical industries manufacturers of agricultural machinery and of tool and wood-carving machines seem to have been most hardly hit by the depression. Lately some improvement has, however, been noticed, and this is also the case in the electrical industry. German competition, though still of much importance, has not been aggravated during 1922, and the tardy delivery of the German works, as well as the difficulties following the German export control, are still prevailing."

E.D.A. Activities.—The latest advertising literature issuing from the E.D.A. offices shows that the Association has hopes of the return of hot weather. Needless to say, the matter relates to electric fans; there is a series of eight attractive designs calculated to stimulate interest in electrical ventilation. The cheapness of the method is insisted upon, and the illustrations and letterpress create the correct atmosphere—which is essential in a fan advertisement. Blocks of the designs can be obtained at the cost of 7s. 6d. each, or 60s. a set, from the Association at 15, Savoy Street Strand, W.C.2.

Holiday Guide.—The Great Eastern Railway Co. has issued (price sixpence) a charmingly illustrated (water colours) booklet concerning "Seaside and Countryside in East Anglia." It is edited by Percy Lindley, and should interest thousands who have not yet fixed upon a place for this year's holidays.

Imported Glassware for Electric Illumination Purposes.—One of the reports recently issued by the Board of Trade under the Safeguarding of Industries Act is that of the Committee appointed under Part II relating to Domestic, Illuminating, and Mounting Glassware. An Order has recently been issued by the Government, and it awaits the approval of the House of Commons, in which a duty of 33⅓ per cent. ad valorem is imposed upon imports from Germany of "illuminating glassware for use with artificial light, not including electric incandescent lamp bulbs, miners' lamp glasses, or oil-lamp chimneys," and the Order is to remain in force until August 19th, 1924. The report contains the following statement:—"Electric bulbs have required special consideration. The original complainants do not manufacture bulbs to an extent which has induced them to bring forward any considerable body of evidence from their own association. The manufacture is carried on upon a large scale in this country; but the concerns chiefly engaged in it have not laid a complaint before the Board of Trade. The import figures for 1921 show that the importation of bulbs on a relatively large scale has not taken place from Germany or Czecho-Slovakia; and the evidence before us does not convince us that the sale, or offer for sale, of such goods from these countries has hitherto had a serious effect upon employment."

Chinese Notes.—The Ta Yu Lee Electricity Co., of Hangchow, has resolved to call for increased capital for the purpose of providing tramways in the city. Electricity will be generated by hydraulic power from the Chien River. Surveys of the river are now taking place.

The Tseng Hwa Electrical Co., a new enterprise promoted by Chen Cao-yung, of Tunghsien, in the metropolitan area, has been registered.

The Kellogg Switchboard & Supply Co. has signed a contract for the installation of a 1,500-line common battery telephone system in Amoy, with 1,000 miles of copper cable. Submarine cables for ten simultaneous connections will link the Island of Amoy with the Foreign Settlement of Kulungsu Island. The contract includes poles, cross arms, insulators, and all pole line hardware. No part of the old system is to be used. The enterprise is sponsored by Mr. Oei Tjoe, a wealthy overseas Chinese.

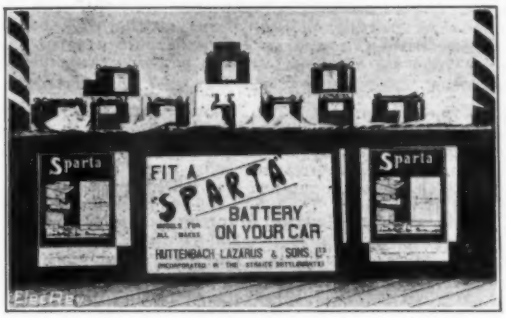
The Shan Sing Electric Light Co. in Hupeh has been granted registration and a licence by the Ministry of Agriculture and Commerce.

An electric light company is to be organised in Mutu Kiangsu with a capital of $20,000.

The Persian Market for Engineering Products.—British firms will hardly be inclined to plunge heavily into the Persian market after reading the views of Major B. Temple (Commercial Secretary to H.M. Legation at Teheran). Not that the country does not need engineering products—indeed there is no other civilised country in the world more devoid of machinery or more pressingly in need of it. But in every way the country is so backward, and its poverty and political instability are so pronounced, that industrialism and machinery have little chance at present, though the economic potentialities are such that some day when there is a general awakening, Persia will become a hungry market for machinery, and then, as Major Temple says, foreign manufacturers who have studied the ground and prepared their plans and pressed their opportunities in the difficult times will have the best chance. Electrical machinery, plant and accessories, internal combustion engines, iron and steel works plant and equipment, and railway and tramway plant are included among the engineering products most obviously and urgently necessary. It is pointed out that what would sell soonest would be small power-generating machines (to do the work of men who turn handles all day). They must be portable and capable of developing from 1 to 4 h.p. on kerosene oil; construction must be simple, and the parts must be strong and durable. Small plant for generating electricity for lighting purposes, charging accumulators, should be capable of being run on kerosene oil, and of maintaining from 50 to 250 lamps of 20 watts each. The adjustment of the power to the load should be automatic.

A "Universal" Award.—The organisers of the Housing and Home Life Exhibition, held in Newcastle-on-Tyne at the end of 1921, have awarded gold medals for the three best displays. Messrs. L. G. Hawkins & Co., Ltd., inform us that one of these was awarded to Electrical Devices, Ltd., their local stockholders, for an exhibition of "Universal" appliances and "Miller" fittings.

British Battery Exhibit at the Malay-Borneo Show.—Messrs. Huttenbach Lazarus & Sons, Ltd., were appointed as sole agents for "Sparta" batteries for Fuller's United Electric Works, Ltd., at the end of 1920 for the Straits Settlements, Malay States, and Southern Siam. Since that date they have carried out a very active and successful sales campaign, and have established well equipped service stations in the principal centres. Their stand at the recent Malaya-Borneo exhibition is here shown.



Annual Outing.—The usual annual outing of the employés of Messrs. Aish & Co., electrical contractors and engineers, of Bournemouth, took place on June 17th, the party going for a trip to Weston-super-Mare by motor coach, travelling *via* Shaftesbury, Shepton Mallet, and Cheddar. The usual toasts and speeches followed the dinner, and the old pier was visited. Swimming races took place in the baths, and afterwards the town was explored. The return journey was made *via* Glastonbury, Yeovil, and Blandford.

Electricians' Wages Reduction.—In accordance with Clause 5 of the "Terms of Settlement" adopted by the National Council for the Electricity Supply Industry in November last, there will be a reduction of a halfpenny per hour in employés' wages as from July 1st. This reduction is based on an average of 81 per cent. addition to the 1914 cost of living, being 9 "points" lower than the figure upon which the last settlement was based. The fall of 6 complete points involves a reduction of ½d. per hour, and the balance of 3 points is carried over to the next period.

New Works at Vancouver.—The erection of a large plant, covering three acres, for the manufacture of wire rope and electrical wire is to be undertaken at Vancouver shortly by the Canada Wire & Cable Co. Between 300 and 400 men will be employed at the start.—*Reuter's Trade Service.*

New French Companies.—There has been launched at Lyons (175, Avenue du Saxe) a *société anonyme* styled Electricité et Mécanique, with a capital of 300,000 fr., for the application and installation of electrical material.

An electrical company whose sphere of operations is French Africa has been embodied at Bordeaux (42, Avenue d'Orléans), with the name of Anciens Etablissements Carpot, and a capital of 1,500,000 fr.

Domestic Appliance Competition.—The Direction des Inventions has opened a prize competition for household appliances. Seven prizes will be awarded—one, 10,000 fr.; two, 3,000 fr.; three, 1,500 fr.; and four, 1,000 fr.; five, six, and seven are 500 fr. each. Articles submitted should be for cleaning, sweeping, heating, washing, cooking, &c., either now on sale or newly-invented. The competition closes on May 1st, 1923. Proposals should be forwarded to the Direction des Recherches Scientifiques et Industrielles, 1, Avenue du Maréchal Gallieni, Bellevue, Seine-et-Oise.

Projected Exhibitions.—An Ideal Homes Exhibition is to be held in Glasgow in the autumn, and the Corporation Electricity Department is to have a stand.

The Electric Lighting Committee of the Stoke Newington Borough Council has decided to hold an electrical exhibition in the Library Hall in October next.

LIGHTING AND POWER NOTES.

Australia. — TASMANIA.—LAUNCESTON.—We have received from the city electrical engineer (Mr. R. J. Strike) a copy of the report and accounts of his department for the year ended June 30th, 1921. A total revenue of £51,647 is recorded; the previous year's income was £40,847. Working expenses totalled £34,266, as compared with £26,964 in 1919-20, leaving a gross profit of £17,381 (£13,883). Of this amount £9,428 was absorbed by loan interest; £1,908 was contributed to sinking fund; £2,289 was transferred to general account; and £3,756 to reserve fund. This shows a net profit of £6,045, as compared with £2,758 in the previous year. The capital expenditure during the year amounted to £7,317, the principal items being a sub-station, battery, foundations, &c., for a new 1,000-h.p. set, motors, and meters. The output increased by 369,224 to 5,582,712 kWh and connections by 751 to 7,596 kW.

HYDRO-ELECTRIC DEVELOPMENTS.—According to the *Argus*, an important statement was made recently by the engineer and manager of the Tasmanian hydro-electric department (M. J. H. Butters). In making public the results of the water-power survey of the State, conducted in recent years, he announced that the present great lake scheme, which, on completion, would generate 60,000 h.p. at Waddamana, could be developed by the addition of 13,000 h.p. from the River Shannon, generated at a point between the river's flow from the lake and its diversion into the canal leading to the Waddamana pipe line. In addition, the water which developed the power at Waddamana could be used again to generate an additional 50,000 h.p., after leaving the power-house and rejoining the Ouse River. Further practicable schemes in the central lakes area were those of Arthur's Lakes (10,000 h.p.), Chudleigh Lakes (25,000 h.p.), the Upper Derwent (80,000 h.p.), the Florentine River (70,000 h.p.), and the Ousdale scheme (8,000 h.p.). On the West Coast the Lake Rolleston scheme was estimated to yield 25,000 h.p., and the King River scheme 65,000 h.p. In the South 20,000 h.p. could be derived from the Huron River. Thus, apart from 60,000 h.p., provided for by the existing Waddamana power scheme, an estimated total of more than 360,000 latent h.p. was readily available for development. In announcing the results of the survey, Mr. Butters stated that he had had inquiries for 20,000 h.p. of electrical energy.—*Reuter's Trade Service* (Melbourne).

SYDNEY (N.S.W.).—The Municipal Council has had a report from the city electrical engineer, setting forth the results of his visit to Great Britain and Europe. The conclusions arrived at may be shortly summarised as follows:—That it is not desirable in the case of Sydney to go beyond 350 lb. per sq. in. pressure in steam boilers. That provided the prices quoted are suitable, the Council should consider the installation of "retort" type automatic stokers. For the present, for the existing power-house, it is not thought that the method of dealing with the ashes by the plant already on order with Messrs. Babcock & Wilcox could be improved on, but various improvements in detail could be made on the plant at present on order, and in the case of the plant still to be put on order for the second four new boilers. That, while in a few years it may be the most economical and in every way the best thing to pulverise coal before using it in the furnace of steam boilers, it is not so in the case of Sydney yet. By the time it becomes necessary to proceed with the design of a second boiler-house at the new power-house, which may be in about three years, the use of pulverised coal may have developed and the position may be different. If, however, the Council decided immediately to acquire a coal property and to establish a power-house immediately adjoining the Council's own colliery, then the city electrical engineer would feel obliged to reconsider this decision. That it is not advisable to provide full automatic differential protection for the whole high-pressure distributing system. That under Sydney conditions there is no reason why a turbo-alternator should not be put on order to run at 3,000 r.p.m., rated at from 14,600 to 16,000 kW even with a power factor of under .8. This size is, in the opinion of the city electrical engineer, as high as it is desirable to go for the main generating units of such a power-house as the City Council may proceed to construct. That if the price is not prohibitive the "armour-clad" type of switchgear would be the best for the City Council's purpose, if it was decided to establish a new power-house. That after inspection and investigation, at the present stage of development, the use of the mercury arc rectifier is not advisable in the case of the Council. That it is advisable to place in some way the control of the Council's electrical undertaking in the hands of a comparatively small committee, preferably not numbering more than five, the members of which should be appointed for not less than three years.

COROWA.—The Municipal Council is extending its electricity undertaking, &c., at a cost of £30,000.—*Reuter's Trade Service* (Melbourne).

Bangor.—ELECTRICITY IN BULK.—The North Wales Power Co. has agreed to furnish the Corporation with a bulk supply of electricity at £6 per kW of maximum demand, with a minimum of £2,000 per annum, plus ¾d. per unit. This is an alternative to a flat rate of 1½d. per unit originally offered.

Bingley.—YEAR'S WORKING.—The electricity undertaking shows a deficit of £303 for the past year, as against a deficit of £2,531 in the previous year.

Bury.—LOAN.—The Town Council is applying to the Electricity Commissioners for sanction to borrow the sum of £2,700 for the laying of a third main between Chamber Hall and Rochdale Road power station, and the permanent laying of the two existing trunk mains along Tanpits Road.

Bury St. Edmunds.—YEAR'S WORKING.—The accounts of the municipal electricity undertaking (engineer: Mr. S. E. Day) for the year ended March 31st, 1922, show a total revenue of £12,621, as compared with £12,093 in 1920-21. Working expenses amounted to £8,168, as against £10,177, leaving a gross profit of £4,453 (£1,916). The net result was £1,913, comparing favourably with a deficit of £446 in the previous year. Owing to the shrinking of the power load, there was a slight decrease in the number of units sold.

PRICE REDUCTIONS.—The Council has approved the following reductions in the price of electricity:—Lighting, from 10½d. to 9½d. per unit. Power, up to 500 units, from 6d. to 5½d. per unit; from 500 to 2,500 units, from 4½d. to 3¾d.; 2,500-5,000 units, from 4d. to 3½d.; from 5,000 to 10,000 units, from 3½d. to 3d.

Calne.—ELECTRICITY SUPPLY.—The Town Council is applying for a Special Order for power to generate and supply electricity in the district.

Chile.—HYDRO-ELECTRIC DEVELOPMENTS.—According to *The Times Trade Supplement*, a new company has drawn up plans for the utilisation of the power of the Colorado and Maipo rivers. A head of 180 metres is available, and it is proposed to install three 10,000-h.p. generating sets, another being added subsequently. A main canal, 8,000 metres in length, of which a quarter will be in tunnel, is to be constructed, and a reservoir is to be made in a natural depression 60 metres above the forebay. Three-phase current will be generated at 6,600 V and 50 cycles. This will be stepped up to 100,000 V for transmission to Santiago by means of double circuits mounted on steel towers. This work is merely the nucleus of a much more comprehensive scheme of hydro-electric power production. It is also proposed to erect a 65,000-h.p. station at Puente de Cristo; this will bring the total utilised water power up to about 110,000 h.p.

Continental.—FRANCE.—A concession has recently been secured by the Société Industrie et Force, of Paris, for the establishment of a hydro-electric generating station at Chartreuse de Vaucluse.

GERMANY.—The Prussian Council of State has exercised its constitutional right, by 44 votes to 22, of placing a temporary veto on a Government scheme for expending 400,000,000 marks on the erection of a State generating station in Hanover, an authorising Bill having already been passed by the Prussian Diet.

BULGARIA.—Steps are being taken by the Government to develop the water-power resources of the country for generating electricity for lighting, traction, and power purposes, to the extent of 1,000,000 h.p. Dams are to be built on the rivers, in the neighbourhood of which generating stations will be set up for the distribution of electricity. The Government is seeking financial aid from private concerns, and trusts have been formed, the first of which, the "Watscha," is preparing plans for the development of the water power of the River Kilschim. This station will supply 260 localities with light and power, and will be followed by other large schemes at Koprinka and Gabrovo. The State is contributing a portion of the construction costs.

Dublin.—ELECTRICITY IN BULK.—The Corporation has confirmed a report of the Electricity and Public Lighting Committee recommending that a supplementary bulk supply of electricity be given to the Urban Councils of Rathmines and Pembroke, the estimated cost being:—For supply to Rathmines only, £8,400, Rathmines to pay one-half; supply to Pembroke only, £1,000; supply to both areas, £8,700, to which Rathmines would contribute £3,600.

Dumfries.—PURCHASE OF UNDERTAKING.—The Committee appointed by the Town Council to deal with the question of electric lighting has recommended the acceptance of the offer of the Dumfries Electricity Co. to sell its undertaking for £60,000. The Maxwelltown undertaking may also be acquired at a price of £8,000.

Edinburgh.—THE LIGHTING OF PRINCES STREET.—Reports setting out the respective merits of high-pressure gas and electric lighting have been presented to the City Council by Messrs. Gracey & Beveridge. Mr. Beveridge states that electric lighting has all the advantages of the gas system without its drawbacks, and the cost of maintenance is less. The Lighting Committee has decided to carry out tests before making a decision on the subject.

Hawarden.—ELECTRICITY SUPPLY.—The Rural District Council has applied to the Electricity Commissioners for a Special Order enabling it to distribute electricity in the Connah's Quay area. The application is being opposed by the Chester Corporation, which has applied for a Special Order to distribute electricity within a radius of five miles of Chester.

India.—THE CAUVERY POWER SCHEME.—The Cauvery power scheme, which was initiated in 1900, is now one of the best assets of the Mysore State, and has given support and employment to the biggest enterprises in Mysore, the Kolar goldfields, and has also in various ways encouraged the development of industrial activities in Bangalore and Mysore cities. Up to 1920-21 the scheme had cost a total sum of about Rs. 152 lacs, and had yielded a net revenue of about Rs. 156 lacs. Besides adding 13,000 h.p. to the total output, the sixth installation provides for the remodelling of the whole system and replacing old and obsolete machinery by machinery of an efficient and up-to-date pattern. The work also includes the removal of the transformer station from its present site and involves construction work requiring considerable engineering skill. The first installation was completed as far back as 1902. Nine hundred cusecs will be maintained during the hot weather by regulating the discharge from the Krishnaraja Sagara, and this amount of water, with the highly-efficient turbines now being installed, will generate a total of 32,000 h.p. It is estimated that, with the erection of a generating station at Krishnaraja Sagara, another 4,000 h.p. will be available, making an aggregate of 36,000 h.p.—*Indian Engineering*.

Keith (Aberdeenshire).—ELECTRICITY SUPPLY.—The Town Council Electricity Committee is negotiating with Edmundson's Electricity Corporation with a view to applying for a Special Order for the formation of a local company to supply electricity.

London.—ST. PANCRAS.—The Electricity and Public Lighting Committee recommends the installation of two 1,000-kW motor converters at the Tavistock Place sub-station to meet the demand for new premises being erected by Messrs. E. Hulton & Co., Ltd. Four l.p. feeder mains, costing £15,000, will also be required. The estimated demand of the company for the first year is 800,000 kWh. It is proposed that an agreement be entered into whereby Messrs. Hulton will indemnify the Council against loss should the proposed new premises not be proceeded with. The contract for the motor converters, it is recommended, should be awarded to Messrs. Bruce Peebles & Co., Ltd.

HAMMERSMITH.—Owing to the satisfactory financial position of the electricity undertaking, the Electricity Committee has been able to recommend further reductions in charges to take effect as from the June meter readings. The price of electricity for lighting will be reduced to 6d. per unit (7d. by prepayment meter). A special scale of discounts is suggested for power consumers and consumers taking combined power and lighting supplies for a minimum period of five years. The flat rate is 1¾d. per unit, and the discounts commence after the consumption of 2,000 units, ranging from 5 per cent. on supplies of from 2,000 to 4,000 to 20 per cent. on a consumption of more than 30,000 units. To power consumers at special rates and for public lighting supplies the surcharge of 100 per cent. fixed in June, 1920, will be reduced to 50 per cent.

The Council has received the sanction of the Electricity Commissioners to the borrowing of £17,735 in connection with the supply of electricity to the Wormholt housing estate; and £16,894 for mains, services, transformers, and meters.

The Electricity Committee recommends the following extensions:—E.h.p. main to Wood Lane, £3,008; diverting main, *vid* Olympia, £4,826; sub-station, switchgear, and transformers, £5,293; total, £13,127.

WESTMINSTER.—The Westminster Electric Supply Corporation, Ltd., is reducing its charges for electricity for lighting by ½d. per unit, and for heating and cooking purposes to 1½d. per unit from the Midsummer quarter's meter readings.

BARKING SCHEME SANCTIONED.—Captain A. E. Martin, M.P. for the Romford Division, has received a letter from Mr. Arthur Neal, Parliamentary Secretary of the Ministry of Transport, stating that the formal consent of the Electricity Commissioners to the establishment by the County of London Electric Supply Co. of a generating station at Barking, designed to contain 100,000 kW of generating plant, and main transmission lines has been handed to the company. The site selected is on the bank of the Thames. When introducing their scheme the promoters intimated that they proposed to spend over two millions sterling in the first two years on the station, and approximately a million on cables.—*Financial Times*.

New Zealand.—LAKE COLERIDGE SCHEME.—The demand for electric energy from the Lake Coleridge hydro-electric scheme is growing to such an extent that it is anticipated that the present arrangements to generate up to 12,000 kW will not satisfy requirements for any lengthy period. The Government is therefore planning to duplicate the pipe line and the generating machinery, bringing the latter up to 24,000 kW.—*Reuter's Trade Service* (Melbourne).

Northwood.—EXTENSION OF SUPPLY.—The Northwood Electric Light and Power Co. Ltd., is extending its distributing mains in the Northwood, Ruislip, and Eastcote districts.

Portsmouth.—PRICE REDUCTION.—The Corporation is reducing the charge for electricity for lighting by ½d. per unit.

Radcliffe.—ELECTRICITY IN BULK.—It has been decided that from the date of the termination of its agreement with the Bury Corporation at the end of the present year, the Council shall obtain a bulk supply of electricity from the Lancashire Electric Power Co.

Rugby.—PRICE REDUCTION.—The Urban Council has reduced the charge for electricity for lighting by ½d. per unit.

Southend-on-Sea.—ELECTRICITY SCHEME.—The Light Railways and Electric Lighting Committee has recommended the adoption of a scheme submitted by the consulting engineer, Mr. C. H. Wordingham, C.B.E., for the generation of electricity by means of turbo-alternators, and the establishment of a generating station on a site outside the borough. The estimated cost of the scheme is £409,000. The borough electrical engineer, however, recommends the continuance of the present works and the installation of additional Diesel plant, at an estimated cost of £240,000.

LOANS.—The Town Council has applied for loans of £30,000 for feeders and distributors, and £30,000 for house services.

Southport.—New Plant.—The Electricity Committee has been considering the tenders for the new plant required for the Crowlands electricity works which was recently sanctioned by the Council. In the special report issued by the electrical engineer it is stated that £4,650 is required for mechanical stokers and water-softening plant; £18,500 for one 1,500-kW, three-phase turbo-alternator, complete with auxiliaries; and £8,000 for a water-cooling tower; total, £31,150; and, in addition, he recommends the expenditure of £38,730 for mains, services, and meters, making the total prospective addition to capital expenditure £70,000.

Whitehaven.—Loan Sanctioned.—The Electricity Commissioners have sanctioned the borrowing of £6,300 for mains and services.

Yarmouth.—Price Reduction.—The Town Council is reducing the charge for electricity for lighting from 10d. to 9d. per unit.

TRAMWAY AND RAILWAY NOTES.

Australia.—Tasmania.—Launceston.—The accounts of the city tramway undertaking for the year ended June 30th, 1921, show a total revenue of £42,591, as compared with £30,822 in 1919-20. Working expenses amounted to £36,510, as against £27,684, leaving a gross profit of £6,081 (£3,138). Against this were charged the previous year's debit balance of £3,186; loan interest, £5,365; and £1,172 contribution to sinking fund; resulting in a net deficit of £3,642. The year's capital expenditure was £12,408, the principal item being permanent way and equipment for the Mowbray duplication. The total number of passengers carried was 4,425,330, an increase of 822,578; the number of car miles run increased to 461,822.

Continental.—Switzerland.—The Federal Council has decided to fix the amount of the second loan for the electrification of the railways at 150,000,000 fr., although the first intention was to take up 200,000,000 fr. The cause of the reduction of the amount of the loan, which was issued at 4½ per cent., is to be found in the expectation that the rate of interest in Switzerland will be further reduced.—*Reuter's Trade Service* (Zurich).

Dewsbury.—Extension of Time.—The Town Council has applied to the Ministry of Transport for an extension of two years for carrying out the work authorised by the Tramway Order, 1911.

Glasgow.—Year's Working.—The Tramways Committee has published an abstract of the Tramway Department's accounts for the year ended May 31st last. The receipts amounted to £2,350,753, as compared with £2,388,444 in the previous year. Working expenses also decreased from £1,937,645 to £1,804,652. The gross profit was thus £546,101, as against £455,189. To this was added £3,541, interest on investments, leaving £549,642 to meet capital charges, &c. These amounted to £396,918, as against £364,633, resulting in a net profit of £152,724 (£105,796). From this profit the balance of the 1919-20 deficit was deducted, giving a final figure of £149,988.

Electricity Charges for Vehicles.—The Electricity Sub-Committee has recommended that the rate for electrical energy used for charging vehicles be fixed at 1½d. per unit and that a rebate of ½d. per unit be made to proprietors of public garages who undertake to charge electric vehicles and to provide the necessary converting plant therefor.

London. — L.C.C. Tramways. — Year's Working. — The accounts of the Council's tramway undertaking for the year ended March 31st, 1922, were presented at the meeting of the L.C.C. on June 27th. The total income was £5,160,320, as compared with £4,904,427 in 1920-21. Working expenses amounted to £4,386,891, as against £4,623,654, leaving a surplus on working of £773,429, a considerable increase upon the previous year's gross profit, of £280,773. Against this surplus was charged a proportion of the renewal costs amounting to £202,848 (£215,639), leaving a balance of £570,581 (£65,134) to meet capital charges, &c. These totalled £758,601, and there was an additional credit of £99,623, making the net result a deficiency of £88,757—the estimated deficit was £7,417. The result was nevertheless extremely satisfactory when it is remembered that the loss in 1920-21 was £590,580. There was a slight reduction in the number of passengers carried, the figures for the two years being 689,452,036 and 688,151,316 respectively. The average passenger receipts per car mile rose from 19.91d. to 20.39d. The track mileage was increased by 12.26 to 155.83.

Estimates for 1922-23.—Estimates for the current year were submitted at the same meeting. Increased revenue and expenditure are anticipated, but the net result is expected to be a profit of £38,337.

Fire at Metropolitan Sub-station.—A serious fire occurred at the Moor Lane sub-station of the Metropolitan Railway on June 24th. The cause is thought to have been an overloaded train which threw out a circuit-breaker at the station. Immediately the circuit-breaker was replaced a shower of sparks came from one of the machines, igniting the contents of a number of "oil tanks." As a result of the occurrence a number of lines were put out of action.

Walsall.—Year's Working.—The accounts of the municipal tramway undertaking (general manager: Mr. C. Burgess) for the year ended March 31st, 1922, show a total traffic revenue of £84,471 and sundry revenue of £1,044—a total of £85,515, as against £98,056 in the previous year. Working expenses amounted to £68,195, as compared with £83,802, leaving a gross profit of £17,320 (£14,254). After crediting rent, interest, &c., and deducting capital charges, the net result was a profit of £3,987, as against £3,107 in 1920-21. The number of car miles run was 799,898, and the number of passengers carried 9,158,260, giving an average traffic revenue per car mile of 25.345d.

Warrington.—Year's Working.—There was a profit of £173 on the working of the tramway undertaking during the past year.

Weston-super-Mare.—Extension of Time.—The Weston-super-Mare & District Electric Supply Co., Ltd., has applied to the Ministry of Transport for an extension of time until August, 1924, for the completion of the tramways authorised by the Order of 1900.

TELEGRAPH AND TELEPHONE NOTES.

Barbados.—Western Union Cable.—The Brazilian Government has granted the Western Union Telegraph Co. authority to construct its Miami-Barbados cable.—*Financial Times.*

Indo-China.—New Wireless Station.—The Compagnie Générale de Télégraphie sans Fil is building a big wireless station at Phuto, near Saigon. The station will be started in September. It will communicate directly with the stations at Sainte Assise and Tananarise. The energy needed will be drawn from the Energie Electrique de l'Indo-Chine, which company is now building near Saigon a generating station of 3,000-kW capacity.

Scilly Islands.—Communication Restored.—Telegraphic communication with the Scilly Islands has been restored, messages being transmitted by wireless from Land's End, says *The Times.*

The Telephone Service.—Reduced Charges.—The reductions in telephone charges which the Postmaster-General announced in the House of Commons some time ago will take effect from the beginning of the next quarter on July 1st. Consequently, in the accounts sent out to subscribers in July, the installation rental, which is payable in advance, will be charged for private houses at the reduced rates, and the local and trunk call fees, which are payable in arrear, will be charged at the present rates. The new charges for local and trunk calls will appear for the first time in the accounts sent out in October.

Wireless Telegraphy.—Service to Spain.—We understand that considerable acceleration of the commercial wireless service between England and Spain has been secured by the recent transfer of this service from the Poldhu station to a new Marconi station at Ongar. Under the new conditions messages to Spain marked "*via* Marconi," instead of being relayed by long land line circuits to Cornwall, are transmitted direct by distant control from Radio House, Wilson Street, E.C., to the receiving station in Spain. Three Continental wireless services are now being conducted simultaneously from the Ongar Marconi station.

Poldhu, in Cornwall, probably the most famous wireless station in the world, has sent its last message. "M.B.D.," its famous call letters, are now replaced by "M.F.T.," the call letters of Clifden. The Irish station of the Marconi Co. has taken up the former station's duty. The future of the Poldhu station is not yet certain; it will probably be used for research work.—*Daily Mail.*

"Ringing-up" Device.—An interesting method of calling up any particular station by wireless—the equivalent of ringing up a telephone subscriber—has been invented by a French engineer, M. L. Chauveau. The receiving station is fitted with a number of magnetic relays, half of them corresponding to dot and half to dash calls, and a time relay. A number of signals are sent by a mechanical device at the transmitting station, arranged in such sequence and at such intervals that they operate the relays, the last of which sets in motion the "ringing up" device.—*Daily Mail.*

West Indies.—Wireless Telephony.—The West India Committee announces that a system of wireless telephony has been successfully established in the British West Indies. The group enjoying it is the Turks and Caicos Islands, Grand Turk being now connected up with South Caicos and Salt Cay, distant twelve and eight miles respectively. By wireless telephone the Commissioner is now able to converse with officials in the neighbouring islands. The system can also be used for wireless telegraphy, and has already proved of great value in enabling the people of Grand Turk to know when steamers are approaching or are leaving Santo Domingo for their shores.—*The Times.*

CONTRACTS OPEN AND CLOSED.

(The date given in parentheses at the end of the paragraph indicates the issue of the Electrical Review *in which the "Official Notice" appeared.)*

OPEN.

Australia.—Waratah (N.S.W.).—July 31st. Commonwealth Steel Products Co., Ltd. One 300-kW rotary converter, complete with transformer, switchgear, instruments, &c. The manager.

Melbourne.—July 11th. Postmaster-General's Department. Telegraph and telephone instruments and parts, silk and cotton insulated switchboard cable, rubber insulated tinned copper wire. (Sched. 25.) August 15th. Tinned copper wire. (Sched. 31.) July 4th. C.B., automatic C.B., and magneto telephones, wall and table patterns. (Sched. 34.) August 22nd. Silk and cotton-covered switchboard cable. (Sched. 35.) July 25th. Paper insulated cable and lead-covered submarine telegraph and telephone cable. (Sched. 42.) October 17th. Automatic C.B. telephone equipment, with all associated equipment, including apparatus for use at subscribers' premises. (Scheds. 39 and 40.) August 9th. Protective apparatus. (Sched. 563.) (June 23rd.)

August 1st. Melbourne and Metropolitan Board of Works. Two (12 million gallons per day) electrical centrifugal pumping plants. Secretary to the Board, 110, Spencer Street, Melbourne.

September 1st. Victorian Electricity Commissioners. Rate-of-flow controller. (Spec. 268.)

September 16th. Victorian Electricity Commissioners. Strain and pin-type insulators. (Spec. 261.) (See this issue.)

Azores.—Ponta Delgada.—July 3rd. Municipal Council. Hydro-electric plant, comprising steel pipe line, &c. (See this column in Elec. Rev., June 23rd.)

Belgium.—July 4th. The municipal authorities of Schaerbeek, near Brussels. 5,000 metres of low-pressure armoured cable, 2 x 10 sq. mm., and 6,000 metres ditto, 3 x 15 and 10 sq. mm.

July 5th. The Belgian Administration des Télégraphes et Téléphones, at La Salle Madeleine, Brussels. Six lots of copper wire totalling 186 tons.

July 5th. Belgian Direction Générale du Ministère de la Défense Nationale, 10, Rue de Méridien, Brussels. 1,280 kilometres of cable for the military telegraph department.

July 14th. La Deputation Permanente de la Province de Limbourg at Hasselt. Equipment of a transformer cabin at Overpelt. Le Bureau du Service Provincial d'Electricité, 27, Avenue Bamps, Hasselt.

July 29th. Municipal authorities of Houdeng-Goegnies, Houdeng-Aimeries and Strepy-Bracquegnies (Province of Hainaut). For the concession for the supply of electricity for public and private lighting and power purposes in the three towns. Hotel Communal de Houdeng-Goegnies.

Cheadle and Gatley.—July 10th. Urban District Council. A.c. meters and maximum demand indicators. (June 23rd.)

Connah's Quay.—July 14th. U.D.C. Sub-station equipment, overhead and underground mains, public lighting and consumers' services. (June 23rd.)

Egypt.—Cairo.—August 22nd. Egyptian State Railways. Supply of desk and wall telephones. Specification from the Stores Department, Saptia (Cairo), or Gabbary (Alexandria). Simultaneous offers will be received at the office of the Administration's Inspecting Engineer in London, Major J. S. Liddell, C.M.G., D.S.O.

Gellygaer.—July 4th. Urban District Council. Transformer plant, e.h.p. and l.p. switchgear, steel poles, h.d. copper wire, cable and boxes, &c., for the Ystrad Hengoed scheme. (June 23rd.)

Gravesend.—July 17th. Electricity Department. One 5,000-kW turbo-generator, condensing plant, switchgear, mains, artesian well, automatic stokers. (June 23rd.)

Ilford.—July 10th. Electricity Department. Mechanical stokers for two marine dryback boilers. (June 16th.)

India.—July 14th. Bombay, Baroda, and Central India Railway Co. Metallic-filament lamps. (June 23rd.)

July 14th. High Commissioner's Department. Submarine cable, v.i.r. insulated and lead-sheathed cable, and braided wire. (June 23rd.)

July 21st. Automatic telephone sets, desk and wall cords for switchboards, &c., cells for accumulators. (See this issue.)

Kirkcaldy.—July 10th. Electricity Works. Converting plant, specification No. 2. (June 16th.)

London.—L.C.C. July 15th. Wiring of the buildings, motors, telephones, and supply and fixing of overhead electrical conductors and main cables, switchboards, &c., at the Eleventh Mental Hospital, Epsom. (June 9th.)

July 24th. H.p. switchgear for the Central Repair Depôt, Charlton. (See this issue.)

H.M. Office of Works.—July 4th. Electrical and/or mechanical engineering labour-in-daywork in Manchester. (June 16th.)

Metropolitan Asylums Board.—July 19th. Installation of the internal automatic telephones at the River Hospital, near Dartford; installation of electric lighting in ward blocks, boiler-house, &c., at the Grove Fever Hospital, Tooting, &c. (See this issue.)

Luxemburg.—July 8th. The municipal authorities of Bertrix (Luxemburg). Establishment of a system of low-pressure electricity distribution in the town, together with the necessary transformer posts.

Navan.—July 12th. Electricity Department. D.c. main switchboard, d.c. generators, overhead mains, &c. (June 23rd.)

New Zealand.—July 10th. Southland Electric Power Board. Transformers, bare copper cable and jointing sleeves, lightning arresters and choke coils, pole type switches, pole type fuses, insulators. (June 23rd.)

Nottingham.—July 3rd. Board of Guardians. Installation of an electric clock at the Bagthorpe Institution and infirmary. (June 16th.)

Prague.—July 12th. For the Seestadtl generating station. Two 15,000-kW turbo-generators, with switchgear equipment; two 110-kVA transformers; two 24-kVA and one 100-kVA transformers, with switchgear; a 22-km. 300 mm. pipe-line from Smichor to Eger; also eight boilers with feed-water accessories. Particulars (100 Czech kronen) from Ministry of Public Works, Prague, or Zentral Elektricitätswerke, Smichor, Preslgasse 6.

Salford.—July 3rd. Electricity Department. E.h.p. and l.p. switchgear and transformers for the Agecroft power station. (June 16th.)

South Africa.—Robertson.—August 14th. Town Council. Two 75-kW steam sets and accessories; one 300-Ah battery; material for distribution, &c.*

July 14th. Rand Water Board. Electric cables, junction boxes, &c.*

Swindon.—July 3rd. Electricity Department. One water-tube boiler, with superheater, chain grate mechanical stoker and pipework. (See this issue.)

Torquay.—July 12th. Electricity Department. One 3,000-kW turbo-alternator and condensing plant. (June 23rd.)

Wimbledon.—July 10th. Electricity undertaking. Four 1,000-kVA, 10,000/2,000-V transformers (June 23rd.)

*A copy of the plan, specifications, and conditions of tender, &c., can be inspected at the Department of Overseas Trade (Room 84), 35, Old Queen Street, S.W.1.

CLOSED.

Aberdeen.—Finance Committee. Recommended:—
Electric lighting of Fish Market (£297).—John Blaikie & Sons, Ltd.

Douglas (Isle of Man).—Corporation. Accepted:—
Station plant (£15,883).—Ruston & Hornsby, Ltd.
Cables (exclusive of laying) (£8,237).—Siemens Bros. & Co., Ltd.
Main switchboard (£1,367).—Kartret Engineering Co.
Storage battery (£2,689).—Premier Accumulator Co.

Dundalk.—Urban District Council Electricity Department. Tenders accepted:—
500-b.h.p. heavy oil engine.—Vickers-Petters, Ltd.
100-kW motor generator.—General Electric Co., Ltd.
Switchboard extensions.—General Electric Co., Ltd.
Balancer.—Metropolitan-Vickers Co., Ltd.
Storage battery (500-volt).—Siebe, Gorman & Co., Ltd.

Glasgow.—Sub-committee on Works. Recommended:—
Two 100-kVA transformers for the Craigton and Mosspark sub-stations (£201 each).—Metropolitan-Vickers Electrical Co., Ltd.
One 25-ton crane for the Alexandra Parade sub-station (£1,001); one 25-ton crane for the Bridgeton sub-station (£967); one 15-ton crane for the latter (£773).—Herbert Morris, Ltd.

Government Contracts.—The following Government contracts were placed during May, 1922:—

Admiralty Contract & Purchase Department.
Charging boards for accumulators.—General Electric Co., Ltd.
Boxes and dry cells.—Ever Ready Co. (Great Britain), Ltd.
Accumulator cells.—Fuller's United Electric Works, Ltd.
Auxiliary dynamos.—Laurence, Scott & Co., Ltd.
Electric light and power installation.—W. H. Heath & Co.
Electric supply cables and external electric lighting installation.—Foot, Milne & Co.
Electrodes.—Quasi-Arc Co., Ltd.; Alloy Welding Processes, Ltd.
Electric fuses.—L. Weekes, Ltd.
Electric motors.—General Electric Co., Ltd.
Contactor panels.—Whipp & Bourne, Ltd.
Elements for radiators.—Credenda Conduits, Ltd.
Switchgear, transformers, &c.—Johnson & Phillips, Ltd.
Fittings for telemotor system.—McTaggart, Scott & Co.
Double and single cotton- and double silk-covered copper wire.—Kent Bros. Electric Wire Co.; E. H. Phillips; London Electric Wire Co. and Smiths, Ltd.; Ward & Goldstone, Ltd.

War Office.
Electric lamps.—Cryselco, Ltd.; General Electric Co., Ltd.

Air Ministry.
Electrical accessories (running contract).—Sun Electrical Co., Ltd.; General Electric Co., Ltd.
Motor generators.—W. Mackie & Co.

Post Office.
Telephone apparatus.—British L. M. Ericsson Manufacturing Co., Ltd.; General Electric Co., Ltd. (Peel-Conner Telephone Works); International Electric Co., Ltd.; Siemens Bros. & Co., Ltd.; Western Electric Co., Ltd.
Testing protective apparatus.—Phœnix Telephone & Electric Works, Ltd.
Telegraph and telephone cable.—Enfield Ediswan Cable Works, Ltd.; Hackbridge Cable Co., Ltd.; Pirelli-General Cable Works, Ltd.
Joint box castings.—United Steel Co., Ltd. (T. Butlin & Co. Branch); Willesden Foundry, Ltd.
Cords for telephones.—Macintosh Cable Co., Ltd.

Ducts.—Donington Sanitary Pipe & Firebrick Co., Ltd.; Middleton Estate & Colliery Co., Ltd.; Oates & Green, Ltd.; Oates (Thornton), Ltd.; J. Place & Sons, Ltd.
Distribution cable plugs.—British Insulated & Helsby Cables, Ltd.; Siemens Bros. & Co., Ltd.
Lead sleeves.—G. Farmiloe & Son, Ltd.
Creosoted wood troughing.—Calder & McDougall, Ltd.; Gabriel, Wade and English, Ltd.
G. I. strand wire.—Rylands Bros. & Co., Ltd.
Manufacture, supply, drawing-in, and jointing cable.—Coventry-Leamington: Pirelli-General Cable Works, Ltd. Preston-Blackburn-Burnley: British Insulated & Helsby Cables, Ltd.
Telephone exchange equipment.—Liverpool (Lark Lane): Automatic Telephone Manufacturing Co., Ltd.; sub-contractors for batteries, Pritchett and Gold and E. P. S. Co., Ltd.; for charging set, Crompton and Co., Ltd. Waterloo (Liverpool): Peel-Conner Telephone Works, Ltd.; sub-contractors for batteries, D. P. Battery Co., Ltd.; for charging set, Crompton & Co., Ltd. Nottingham: Western Electric Co., Ltd.

H.M. OFFICE OF WORKS.

Engineering services.—Leeds (electrical labour): T. Clarke & Co., Ltd. Newcastle-on-Tyne (electrical and mechanical labour): The Brightside Foundry & Engineering Co., Ltd.; Southampton (electrical and mechanical labour): Southampton Guild. Windsor (electrical and mechanical labour): Alpha Manufacturing Co.

CROWN AGENTS FOR THE COLONIES.

Electric overhead travelling crane.—Herbert Morris, Ltd.
Underground telephone cable.—Johnson & Phillips, Ltd.
Generating plant.—English Electric Co., Ltd.
Track circuiting material.—Tyer & Co., Ltd.
Telephone material.—Western Electric Co., Ltd.
Telephone switchboards.—British L. M. Ericsson Manufacturing Co., Ltd.
Induced draught plant.—Davidson & Co., Ltd.

Leyton.—Urban District Council. The Council is recommended to authorise the sealing of contracts with Mr. Bertram Thomas for a l.p. switchboard; and with the Union Cable Co., Ltd., for distributor cables.

London.—L.C.C. Highways Committee.
Ash conveyor and ash hopper for Greenwich power station:—

	Ash hopper.	Ash conveyor.
	£	£
Yorkshire Hennebique Contracting Co., Ltd. (incomplete)	1,434	783
R. Dempster & Sons, Ltd.	1,980	3,285
Gordon Harvey Co.	2,065	3,390
†New Conveyor Co., Ltd.	2,089	3,847
Mansfield Engineering Co., Ltd.	2,096	5,322
†Babcock & Wilcox, Ltd.	2,265	5,019
†E. Bennis & Co., Ltd. (accepted) ...	**2,409**	**2,875**
Peirson & Co.	2,460	—
Robson Engineering Co., Ltd.	2,577	4,614
†Underfeed Stoker Co., Ltd.	2,578	4,462
Paterson Hughes Engineering Co., Ltd. ...	2,890	6,614
G. Robson & Co.	2,970	3,643
Ransome Machinery Co. (1920), Ltd. ...	3,095	—
J. Garrett & Son	3,277	—

† These firms also submitted alternative tenders.

ST. PANCRAS.—Electricity Committee.
Glazing roof of h.p. switchroom at Regent's Park station (£205).—W. H. Hayward & Co.
Two motor-generator balancers or converters for the Tavistock Place sub-station:—

	£	
General Electric Co., Ltd. ...	8,530	for motor generator balancers or motor converters.
Newton Bros. (Derby)	9,760	ditto
Crompton & Co., Ltd.	10,454	ditto
Bruce Peebles & Co., Ltd. (recommended)	**10,800**	**Motor converters**
Bruce Peebles & Co., Ltd. ...	14,250	Motor generator balancers
English Electric Co., Ltd. ...	10,800	ditto
Brush Electrical Engineering Co., Ltd.	11,760	ditto
British Thomson-Houston Co., Ltd.	11,915	ditto
Mather & Platt, Ltd.	12,140	ditto
Electric Construction Co., Ltd.	12,350	ditto
Metropolitan-Vickers Electrical Co., Ltd.	16,408	ditto

The Chief Electrical Engineer reports that the sub-committee appointed, consisting of the chairman, the deputy-chairman, and himself, after due consideration, has selected the tender of Messrs. Bruce Peebles & Co., Ltd., for the supply of motor converters at £10,800, as, although not the lowest, it has been ascertained to provide advantages as to space, interchange of parts, &c.

HACKNEY.—Electricity Committee. Recommended:—
Chemical treatment of condensing water, manometer type, chloronome £270 (less £20 for the hire of a temporary plant).—Paterson Engineering Co., Ltd.

HAMMERSMITH.—Electricity Committee. Recommended:—
Construction of boiler-house in connection with the installation of two new "Stirling" boilers (£2,021).—W. Alban Richards & Co.
Feed-water heater (£1,550).—Clay Cross Co., Ltd.

New Zealand.—Wellington City Council. Accepted:—
Supply of electrical material at the new power-house (£32,450).—Metropolitan-Vickers Electrical Co., Ltd.—*Reuter's Trade Service* (Wellington).

Rugby.—Urban Council. Accepted:—
1,050 yards of l.p. three-core cable.—Henley's Telegraph Works Co., Ltd.
Three transformers.—British Thomson-Houston Co., Ltd.

FORTHCOMING EVENTS.

Royal Institution of Great Britain.—Monday, July 3rd. At Albemarle Street, W. At 5 p.m. General meeting.

Institute of Physics.—Tuesday, July 4th. At the Institution of Electrical Engineers, Victoria Embankment, W.C. At 5.30 p.m. Lecture on "Physics in Industry." No. 2.—"The Physicist in Engineering Practice," by Sir J. Alfred Ewing, K.C.B., F.R.S.

Electrical Power Engineers' Association (Derby and District Section).—Saturday, July 8th. At the Queen's Hotel, Bridge Street, Burton-on-Trent. At 5 p.m. Lecture on "Economy in Mains Laying," by Mr. T. A. G. Margary.

THE "ELECTRICAL REVIEW" SERVICE DEPARTMENT.

To enable us to complete replies to queries received this week, we need the names of suppliers or manufacturers of:—
Geoffrey fuses.
Calido irons.
Brierley crystal glass shades.
The present address of Messrs. R. Wolff, engineers, formerly of Laurence Pountney Hill.

NOTES.

London Theatre Regulations.—The Theatres and Music Halls Committee of the London County Council has revised the regulations governing the construction of places of amusement. The lighting and heating of such buildings are the subjects of special supplementary regulations. Rules are made ensuring that engine and boiler rooms are separated by fire-resisting material from the main building. Motor-generators, vacuum-cleaning, and other electrical apparatus must be kept in enclosures constructed of fire-proof material, and ventilated to the outer air. Lift shafts are to be entirely enclosed with fire-reaisting material, and the motor is to be placed in an accessible position at the head of the shaft. No fire-place must be formed, and no system of heating which involves the use of a naked flame may be installed, in any portion of the auditorium or stage.

British Standard Specification.—The British Engineering Standards Association has published Specification No. 138-1922, which lays down rules regarding the materials and constructional strength of chemical fire extinguishers. It is specified that extinguishers purported to be made in accordance with the sjecification must withstand an internal hydraulic pressure of 300 lb. per sq. in., but the pressure generated under working conditions must not exceed 100 lb. per sq. in. Copies of this Specification can be obtained from the Association at 28, Victoria Street, S.W.1., price 1s. net.

National Association of Supervising Electricians.—A successful smoking concert was held at St. Bride's Institute on June 13th. Major Vincent T. Smith, M.C., M.I.E.E., occupied the chair, and announced that owing to ill health, he found it necessary to resign his position as President; he could not take an active part in affairs and he did not wish to become a "sleeping partner." Mr. W. E. Highfield, M.I.E.E., had consented to succeed him as President, and he (Major Smith) was convinced that the Association could not have a better man for the position. In concluding his speech he thanked several gentlemen for their assistance, making special mention of Messrs. Windibank, F. W. Smith, and Brammer.

Mr. Highfield thanked the members for the honour they had conferred upon him, for the Association was a most important one. He hoped that his experience would be of use to them.

Mr. Windibank expressed the Association's regret at Major Smith's resignation and welcomed Mr. Highfield as his successor. Messrs. Revell and Brammer associated themselves with Mr. Windibank's remarks, and Major Smith replied.

Mr. F. W. Smith, past chairman, said that the I.E.E. had done the Association the honour of inviting its co-operation in a number of matters; this was surely a hall-mark of progress.

Mr. F. S. Alldread then proposed a vote of thanks to the members of Mr. Alfred Stone's concert party, who provided an excellent programme.

Whitley Committee.—In response to an application from the technical staff of the electricity undertaking, the St. Pancras Electricity and Public Lighting Committee recommends the formation of a works committee to deal with matters mutually affecting the Council and the technical staff.

The British Association.—The British Association for the Advancement of Science has distributed the preliminary programme of the annual meeting, to be held in Hull, from September 6th to 13th. The President (Prof. Sir C. S. Sherrington, G.B.E., P.R.S.) will open the proceedings with an address on "Some Aspects of Animal Mechanism," in the City Hall on Wednesday, September 6th. Among the sectional addresses, which will be delivered over the whole period of the meeting, are the following:—Section A (Mathematics and Physics), "The Theory of Numbers," by Prof. G. H. Hardy, F.R.S.; Section F (Economics), "Equal Pay to Men and Women for Equal Work," by Prof. F. Y. Edgeworth; Section G (Engineering), "Railway Problems in Australia," by Prof. T. Hudson Beare.

Among the discussions which will take place in Section A is one on "The Origin of Magnetism," to be opened by Prof. Langevin (Paris), and Prof. Weiss (Strasburg). As at last year's meeting, several of the sectional addresses will be introductory to discussions.

Golf.—The completion of the Golf Cup competition of the Institution of Rubber Industry for Col. Wallwork's Hundred Guinea Cup will take place at the Hesketh Park Golf Club, Southport, on Friday, July 21st, when the undermentioned will compete by match play: Semi-final, 18 holes in the morning; and final, 18 holes in the afternoon. Partners to be drawn for. Play to commence at 10 a.m. and 2.30 p.m.

Major E. Wallwork (7) (Jas. Wallwork & Sons, Ltd., Manchester).
Mr. H. W. Franklin (8) (J. G. Franklin & Sons, Ltd., London).
Mr. J. H. C. Brooking (13) (St. Helens Cable & Rubber Co., Ltd., Warrington).
Mr. W. C. Smith (15) (Anchor Cable Co., Ltd., Leigh).

Jubilee of the Eastern Associated Telegraph Companies.—It is proposed to celebrate the fiftieth anniversary of the incorporation of the above companies, whereby the various preliminary undertakings instrumental in establishing telegraphic communication by submarine cables throughout the Empire and other parts of the world were consolidated in 1872, by a banquet, fête, and reception, to be held in the gardens of the Royal Botanic Society, on July 24th, when H.R.H. the Duke of York, K.G., will be present, and invitations are being issued to the Cabinet, ambassadors and representatives of foreign countries and the colonies and other distinguished guests. As a token of loyalty, the staffs of the companies are to mark the occasion by a presentation to the chairman, Sir John Denison-Pender, G.B.E., K.C.M.G., in recognition of his life-long service in furthering the interests of submarine telegraphy and those associated therewith. The presentation will take the form of a bound volume containing the signatures of nearly 8,000 subscribers, and the reproduction in platinum, set with brilliants, of the stars of the insignia of the Orders of Knight Commander of the Most Distinguished Order of St. Michael and St. George and Knight Grand Cross of the Most Excellent Order of the British Empire. In addition they are permanently endowing a bed in St. Bartholomew's Hospital to the revered memory of Lady Beatrice Katherine Denison-Pender (the chairman's late wife). The Rt. Hon. the Lord Mayor and the Lady Mayoress have consented to be present at the dedication on July 20th, when the tablet will be unveiled by the Lady Mayoress.

Throughout the war the Eastern Associated Telegraph Companies (the group comprises ten companies) were in close co-operation with the naval, military and administrative authorities, both at home and abroad, and laid, maintained, and worked many strategic cables required by the British Government and its allies for the successful prosecution of the war. The companies placed their organisation wholeheartedly at the service of the Government, and were entrusted with the transmission of its secret and confidential telegrams. They also lent useful help to the State in connection with censorship of telegrams, &c., and in addition, they carried during the war three million words free of charge in connection with wounded, Red Cross, and other benevolent institutions.

When the Eastern Co. was incorporated in 1872, there were only about 8,000 nautical miles of cables in existence; now there are roundly 325,000 miles. The capital invested fifty years ago was roughly only two million pounds sterling. The capital of private enterprise alone is now about fifty millions sterling, nearly half of which is represented by the undertakings comprising the Eastern Associated Telegraph Companies.

Appointments Vacant.—Sub-station attendant (87s. 3d.), for the Stoke Newington B.C. electricity department; chief clerk (£134 + £116), for the Aberdare U.D.C. electricity and tramways department; engineer-in-charge, for the electricity undertaking of the Nenagh Gas & Electricity Supply Co., Ltd.; chief lecturer in electrical engineering (£300 to £350), for the Leeds Technical School; generating engineer, for the Belfast Corporation electricity department. (See our advertisement pages to-day.)

Royal Society's Soirée.—The second conversazione of the two given annually by the Royal Society was held at Burlington House on June 20th. The majority of the exhibits on view were the same as at the first conversazione last month. Mr. Campbell Swinton had a wireless apparatus which, with the aid of a short aerial on the roof, was recording messages on a moving-coil siphon recorder; and Sir William Bragg's models of crystal structure, shown last time, were accompanied by a cognate exhibit from Mr. William Barlow. There were also exhibits from Greenwich Observatory, the National Physical Laboratory, the Instrument Section of the Air Ministry, and the Explosives Research Department, Woolwich.—*The Times.*

Light Railway Commissioners.—ANNUAL REPORT.—The final annual report for the year 1921 and part of 1922, of the Light Railway Commissioners, who ceased to hold office on February 19th, 1922, under the terms of the Railway Act, 1921, has recently been published. It is brought to remembrance that the Commission was established by the Act of 1896, for a period of five years. About that time the application of electricity and steam power was leading to a great extension of tramways, which in some important respects could be more adequately dealt with if promoted as light railways under the Act of 1896, than under the Tramways Act of 1870. The volume of applications received during the first five years necessitated the continuance of the Commission and a large number of Orders were made. The Commissioners note with regret, however, that the actual result in mileage of lines constructed was disproportionate to the number of Orders granted. Unfortunately, the Report does not contain statistics in comparison of actual construction to schemes approved. Tabular statements show that under the heading of Class A (lines on acquired lands, mostly steam motive power) 275 schemes involving a mileage of 2,930 were submitted, and that 180 of these with a length of 1,570 miles were submitted for approval to the Board of Trade, or, later, the Ministry of Transport. Under Class B (lines on public roads, mostly electric motive power) 284 projects with a mileage of 2,024 were put before the Commissioners; of these 163 (684 miles) were submitted for confirmation.

Cost of Electricity.—The North of Ireland Shipbuilding Co., Ltd., which has its yard on Lough Foyle, Londonderry, has closed down. The management states that it has had to do so owing to the heavy electrical charges.

S.s. "British Engineer."—The s.s. *British Engineer*, built by Messrs. Workman, Clark & Co., Belfast, for the British Tanker Co., went through her acceptance trials most successfully on the 23rd inst. in Belfast Lough. This steamer has all her auxiliary machinery operated by electrical power, and the steering gear is on the electro-hydraulic principle (Hele-Shaw). There is also a complete long-range Marconi installation. The sister tanker, *British Workman*, has just returned from a very successful Eastern trip—her maiden one.

Service Notes.—Lieut. F. J. Wylie has been posted to the cruiser *Queen Elizabeth* as wireless officer. Lieut. Wylie was commissioned during the war, and reached his present rank in October, 1917.—Capt. B. B. Edwards, M.C., Royal Engineers, has been appointed an instructor (Class CC) at the School of Electric Lighting. Capt. Edwards was commissioned in the Royal Engineers in September, 1914—a month after the Great War started—was promoted lieutenant in October, 1917, and captain in November of that year. Capt. Edwards was mentioned in dispatches on two occasions—June and November, 1916—and was awarded the Military Cross for conspicuous courage in action. He was twice wounded.

Municipal Tramways Association.—On June 15th and 16th, the annual meeting of the Managers' Section of the Association was held in Glasgow, when about 50 delegates attended. After an official welcome by the convener of the Corporation Tramways Committee, to which Mr. J. B. Hamilton (Leeds) replied, Mr. Alexander Gerrard (Glasgow) read a paper on "The Maintenance of Rolling Stock." On the second day, Mr. R. Beattie (Manchester) delivered a paper on the prevention of accidents. The Section paid a visit to the Corporation's car works at Coplawhill, and a charabanc drive to Aberfoyle was also arranged.

Electrolytic Cell Capacities.—Messrs. A. Griffiths, D.Sc., and W. T. Heys, B.Sc., of Birkbeck College, London, have developed a new and simple apparatus for the measurement of the capacities of electrolytic cells, which allows corrections to be made for the leakage and self-polarisation of the cell. It gives results consistent to one or two per cent., and of the same order of magnitude as those obtained by other observers. The authors are engaged in a study of the variation of the polarisation-capacity of an electrolytic cell, consisting of platinum plates in sulphuric acid, when subjected to an intermittent current, and they have developed an apparatus containing some original features which are described in the *Proceedings* of the Physical Society of London. In order to correct for the rapid leakage or self-depolarisation which apparently constitutes nearly all the difficulty in measurements of this kind they employ a falling-plate method for making connection for short, variable, and calculable periods.

British Electric Locomotives for Japan.—*The Times* of yesterday states that the Imperial Government Railways of Japan have ordered 34 complete electric locomotives from the English Electric Co., Ltd., of a total value of considerably more than £500,000. Eight of the locomotives are for heavy express passenger service. Weighing approximately 96 tons each, they are designed for hauling a 415-ton train at a speed of about 60 miles an hour. The remaining 26 locomotives are for heavy freight and local passenger traffic, and will weigh about 56 tons each. The order has been secured in the face of strong foreign competition, especially from America. It covers the whole of the locomotives required by the Japanese Imperial Government Railways to carry out their programme of main-line electrification down to the end of 1923.

British Oil.—Those who dreamed of a great British oilfield are doomed to disappointment, says the *Evening News*, which reports that the last stage in the Government-aided search for oil in Derbyshire is being reached in the sale by auction of the boring, pumping, and storage plant used at the various wells in the Chesterfield district. It was in October, 1918, that the oil-boring operations at Hardstoft were inaugurated, and although a number of other sinkings were made in various parts of North-East Derbyshire, Hardstoft proved to be the only well to yield oil. By direction of the Government Disposal and Liquidation Commission a firm of auctioneers is to sell the plant, this being the first auction of oilfield material to be held in this country.

INSTITUTION NOTES.

Institution of Civil Engineers.—On Tuesday last the annual conversazione of the Institution was held, the guests being received by the President, Mr. W. B. Worthington. Amongst the entertainments provided was a lecture by Capt. H. Riall Sankey, on "Broadcasting"; wireless demonstrations were also given by Messrs. Marconi's Wireless Telegraph Co., Ltd. There was as usual a collection of models and apparatus on exhibition.

Institution of Electrical Engineers.—THE WAR MEMORIAL.—On Wednesday last the unveiling and dedication of the memorial to those members of the Institution who gave their lives in the Great War took place. The memorial consists of two large bronze tablets, on either side of the entrance hall, on which the names of the members are engraved. The Dean of Westminster (the Rt. Rev. Bishop Ryle, K.C.V.O., D.D.) said the prayers of dedication, after the singing of the hymn "O God, our help in ages past." The unveiling was then conducted by Air Chief Marshal Sir H. M. Trenchard, Bart., K.C.B., D.S.O., assisted by the President (Mr. J. S. Highfield) and the Senior Vice-President (Dr. W. H. Eccles, F.R.S.). Sir Hugh Trenchard, in a brief address, said that over 2,000 members of the Institution were on active service in the war, and other members were engaged in the production of electric machinery and power for the supply of munitions. Of those on active service 162 laid down their lives. Over 500 war decorations were awarded to members of the Institution. Between the middle of September and the middle of October, 1914, the Institution, in conjunction with the Institutions of Civil and Mechanical Engineers, recruited 670 engineers, the full complement required for the Engineer Units of the Royal Naval Division. The memorial was a sign-post for future generations, pointing out the path of duty and patriotism. Bishop Ryle then pronounced the blessing, and the "Last Post" was sounded, followed by the "Reveille." The proceedings concluded with the singing of the National Anthem. Choristers of H.M. Chapel Royal, Savoy, were in attendance, and music was provided by a portion of the Royal Engineers' Band.

NORTH-WESTERN CENTRE.—The report of the committee for the twenty-second session, 1921-1922, shows that eleven ordinary general meetings have been held and two special public meetings. The average attendance at the ordinary meetings was 115, which is a slight increase on previous years' records. In accordance with the wishes of members, four informal meetings were arranged during the session. The discussions were very "live," and brought out a number of new speakers, and the committee feels amply justified in recommending the continuance of the informal meetings during next session. The total number of speakers for the whole session was 90, giving an average of nine for each meeting, which shows an increase over last session. The committee extended invitations to the Institution of Heating and Ventilating Engineers and to the Manchester Association of Engineers to attend the meetings of February 21st and March 21st respectively. Both invitations were accepted and a number of visitors participated in the discussions. Two public meetings were held at the Manchester College of Technology, kinematograph films on switches, telephones, &c., were exhibited, and Prof. W. L. Bragg delivered a lecture on "Recent Developments in Atomic Research." The latter function was the annual public lecture which has now been arranged by the North-Western Centre for four years in succession. The attendance was about 900 and 600 respectively. The President, Mr. J. S. Highfield, visited the Centre on December 13th and addressed the members, and also took part in the discussion at the meeting on that day. The annual dinner proved an enjoyable function. The total attendance was 120, including 12 guests, amongst whom were the President, the Mayor of Salford, the President of the Chamber of Commerce, and the Secretary of the Institution. The membership of the Centre shows a considerable increase, the figure being 1,343. The assistant secretary, Mr. A. L. Green, has been elected an Associate (Honorary) of the Institution in recognition of his 21 years' service to the North-Western Centre. As a result of the special appeal a sum of £109 10s. 7d. was collected in the North-Western Centre area for the Benevolent Fund, of which £44 14s. 6d. was contributed by the Liverpool Sub-Centre. Mr. J. Frith has undertaken to act as local hon. treasurer for this fund. The Council has accepted the invitation of the North-Western Centre Committee to hold the Institution summer meeting for 1923 in Manchester. The committee for 1922-23 (coming into office September, 1923) is as follows:—*Chairman*: A. S. Barnard. *Vice-Chairmen*: G. A. Juhlin, H. C. Lamb. *Committee*: A. G. Ellis, A. G. Livesay, A. J. Lunn, A. B. Mallinson, W. J. Medlyn, S. L. Pearce, J. S. Peck, H. A. Ratcliff, C. D. Taite, R. Townend, B. Welbourn, W. J. H. Wood. *Ex-Officio Members of Committee*: Julius Frith (past chairman), W. Walker (past chairman), B. Welbourn, chairman Liverpool Sub-Centre, O. C. Waygood, hon. secretary Liverpool Sub-Centre. *Hon. Secretary*: W. A. Coates. *Assistant Secretary*: A. L. Green.

The committee of the Students' Section records a very successful session. There have been eight ordinary meetings, the average attendance being 50. The standard of the papers has been high, and on all occasions they have been followed by exceedingly lively discussions. Four visits to works were arranged, and the committee has met on three occasions.

LIVERPOOL SUB-CENTRE.—The third annual report of this Sub-Centre shows that the committee has held eight meetings, the average attendance being 12. Seven ordinary general meetings have been held, with an average attendance of 99. Mr. J. S. Highfield, President I.E.E., on December 12th, addressed the members on matters of general interest. The committee for the 1922-1923 session is as follows:—*Chairman*: B. Welbourn. *Vice-Chairmen*: E. M. Hollingsworth, H. H. Harrison. *Committee*: L. Breach, T. D. Clothier, A. J. Eames, J. Hamilton, B. T. Hawkins, W. Lang, A. E. Malpas, J. A. Morton, E. Moxon, P. Priestly, P. J. Robinson, F. J. Teago. *Past Chairmen* (ex-officio members of the committee): Prof. E. W. Marchant, D.Sc., H. Dickinson, G. H. Nisbett. *Hon. Secretary*: Oscar C. Waygood. The total expenses for 1920-21 sessions amounted to £204, including the students' total of £25. The membership of the Sub-Centre shows a steady growth, the total being 447.

The committee of the Students' Section records a very successful session. Four committee meetings have been held, the average attendance being 10. Nine ordinary general meetings (average attendance 45) and one open meeting (150 present) have been held, and an informal discussion was held, which proved to be very successful, 15 speakers taking part. Six visits to works have been held, the average attendance being 35.

Association of Mining Electrical Engineers.—The West of Scotland branch of the Association has appointed the following office bearers for the year:—*President*, Mr. D. Martin; *Vice-Presidents*, Messrs. D. McQueen and D. L. Frew; *Secretary*, Mr. D. S. Baddeley. The membership now stands at 340.

South Wales Institute of Engineers.—On May 25th, Mr. C. E. Stromeyer, O.B.E. (chief engineer, Manchester Steam Users' Association), read a paper on "Fatigue of Metals" before the Institute. In this the author gave the results of research work upon this subject, using a formula for the empirical law of fatigue developed in a previous paper. This formula is $S = F1 + C(10^6/n)$ where S is the alternating stress which will cause failure after being repeated n times, F1 is the fatigue limit of the material, and C is a constant.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Mr. E. B. PAUSEY has resigned his appointment as power station superintendent at the Loughborough Corporation electricity works, having accepted an appointment in a similar capacity at the Poulton power station of the Wallasey Corporation.

Mr. A. S. TRESILIAN, B.A., B.Eng., A.M.Inst.C.E., until lately general manager of Messrs. Boving & Co., Ltd., and Electro-Metals, Ltd., is severing his connection with those companies, and is taking up a position with the Spearing Boiler Co., Ltd., of 20, Kingsway, W.C. 2. Prior to his engagement with Messrs. Boving, Mr. Tresilian spent several years as sub-station superintendent in India with the Bombay Electric Supply & Tramway Co., Ltd., and on returning home took up a position on the commercial staff of the British Thomson-Houston Co., with whom he remained for ten years, during the latter portion of which he occupied a responsible post in connection with the development of its turbine sales and contract work. Mr. Tresilian will take up his new duties on July 1st.

Sydney (N.S.W.) City Council Electricity Supply Committee has decided to increase the salary of Mr. FORBES MACKAY, the chief electrical engineer and manager, from £1,400 to £2,000 per annum, and that of the deputy general manager (Mr. MALING) from £900 to £1,300 per annum. This recommendation was made as the first of those of the sub-committee, which is inquiring into the working of the electricity department with a view of ascertaining what changes can be made in administration, in order to secure greater efficiency combined with economical administration. It is the intention of the committee that for the future Mr. Forbes Mackay shall be given full control of the whole department, and all its under departments, and that all these are to be run on strictly commercial lines, with no interference from aldermen as to the men to be employed or dismissed.—*Sydney Morning Herald.*

Ald. HAMILTON has retired from the chairmanship of the Preston Electricity Committee.

Sir ERNEST JARDINE, BART., governing director of John Jardine, Ltd., manufacturers of power transmission appliances,

has been elected president of the Notts. Football Association for the 18th year in succession.

To-day, at the Sheffield University Degree Day Congregation, the honorary degree of Doctor of Engineering is to be presented to the Hon. Sir CHAS. PARSONS. Mr. DOUGLAS VICKERS was also to be made Doctor of Engineering, but as he cannot be present the conferment is postponed.

The Metropolitan Electric Supply Co., Ltd., have appointed Mr. H. RICHARDSON, manager of the electricity undertaking of the Dundee Corporation, as general manager of the company, in succession to Mr. W. R. Rendell, who, as already announced, has resigned on account of ill-health. Mr. Richardson, who has been electrical engineer to the Dundee Corporation since 1903, will take up his new duties on October 1st next.

Obituary.—DR. WALTHER RATHENAU.—By the assassination of Dr. Walther Rathenau, supposedly as part of a scheme to restore the Royalist party to power, Germany has not only lost a Foreign Minister whose ambition for some months past has been to lay financial and economic foundations upon which could be built up a stable national life, but she has lost one who, as the head of the Allgemeine Elektricitäts Gesellschaft, was unquestionably the outstanding head of German electrical engineering industry, finance, and export trade. He was the son of the late Emil Rathenau, and was born in 1867. *The Times* reminds us that Emil was "one of the numerous commercial spies who came to England in bygone years," serving as a voluntary draughtsman in the engineering firm of John Penn & Co., and after his return to Germany he organised the A.E.G., of whose developments in that country, its amalgamation with, or absorption of, other interests, and its enterprises in this country and throughout all parts of the world, little need be said to inform the readers of the REVIEW. Walther became the head of the organisation primarily because he was the son of his father, but he was personally well fitted by education, experience, and personal qualities to do so apart from that circumstance. When he took the helm on the death of Emil, in 1915, he had already a very firm grasp of A.E.G. policy and of its interests in different markets, including the United Kingdom, the British Colonies, South America, Switzerland, &c., and he had had much to do with the success which attended the efforts of its manifold undertakings. Prior to the war, however, his name and reputation were little known to the general population of these islands. It was after war had broken out and Walther Rathenau saw that it was not going to be so short an affair as had been supposed by those who precipitated it, that he came into greater prominence. He saw that there was a danger, if the war lasted long, of shortage of raw materials arising through inadequate organisation. He was appointed Director of Raw Materials, and but for the measures that were taken by him, backed by dictatorial powers, to mobilise the whole industrial supplies and manufacturing facilities of the German Empire and of occupied territories, the war would not have lasted until November, 1918. We have published a number of Dr. Rathenau's speeches, delivered during and since the war, in the ELECTRICAL REVIEW, and it is not necessary to refer to them further now that he is dead, though it must not be supposed that the death of Rathenau will necessarily involve any alteration in the principles and policy for which he stood industrially through the medium of the A.E.G. and other interests with which he was identified. It may be news to some of our readers that he was a writer of many books on philosophical and sociological subjects and that he had visions of a time, perhaps far off, when there would dawn a new and better day for everybody, when there would be an Ideal State. It was stated at one period of the war that he had made over to the State one million pounds of his private fortune. In recent months he had been thrust by circumstances into political office of immense importance where he, as Foreign Minister, had been endeavouring to bring about "a rational settlement in Europe," but, as the daily Press has reported, he was not born to or versed in the art of diplomacy, and success did not follow his efforts in that connection. His active interest in negotiations with France respecting reparations in kind, his mistaken action in signing the agreement with Russia while the Genoa Conference was meeting, his conferences with British statesmen and financiers regarding international economic restoration—these and other such matters had occupied his attention recently, and now that he has fallen by the hands of assassins it is recognised that Germany has lost a man who as a German was doing his utmost to help his native land out of the difficulties following upon a war which her world-power seekers had brought to terrible accomplishment a year too soon. He will no doubt have capable successors in the A.E.G., and men will arise to take far-seeing action in the political interests of Germany, but at the moment it seems as though those responsible for his death have precipitated for the land that he was serving another great crisis, the outcome of which cannot be predicted.

Wills.—The late Mr. J. N. PAXMAN left £109,063 gross and £105,189 net personalty.

The late Mr. J. E. HYDE, a director of the Campbell Gas Engine Co., Ltd., left £36,032 net personalty.

NEW COMPANIES REGISTERED.

Gardy Co., Ltd. (182,546).—Private company. Registered June 19th. Capital, £1,000 in £1 shares. To carry on the business of electrical, mechanical and other engineers and contractors, &c. The first directors are:—G. Gardy, 9, Rue Adolphe Yvon, Paris (XVI); L. Lafontaine, 7, Rue Paul Baudry, Paris (VIII); Comte Boudouin de Marotte De Montigny, 3, Rue Pajou, Paris (all electrical engineers). Secretary: A. J. Barnett. Registered office: 48, Mark Lane, E.C.

Wax Electric Light Tube Manufacturing Co., Ltd. (182,603).—Private company. Registered June 21st. Capital, £2,268 in 2,250 8 per cent. preference and 18 management shares of £1 each. To carry on the business of manufacturers of and dealers in wax electric light tubes and other similar articles, electrical engineers, &c., and to adopt an agreement with J. A. Gems. The permanent directors are: J. A. Gems, 56, Brentham Way, Ealing, W.; G. Shearburn, "Ranmore," West Ealing, W.; H. M. Scales, 25, Redcliffe Street, South Kensington, W. Qualification: 3 management and 100 preference shares. Remuneration as fixed by the company. Secretary: H. M. Scales. Registered office: The Studio, Queensborough Passage, Lancaster Gate, W.

Gessolin Bowl Co., Ltd. (182,621).—Private company. Registered June 22nd. Capital, £200 in £1 shares. To carry on the business of fabricated or plastic bowl manufacturers for indirect lighting and other purposes, electrical and gas engineers, brassfounders, wire workers, stampers and piercers, &c. The first directors are: H. Haynes, 124, St. Clement's Road, Nechells, Birmingham; G. Brenni, 18, Worcester Street, Birmingham. Qualification: 10 shares. Registered office: 124, St. Clement's Road, Nechells, Birmingham.

Birmingham Electric Castings, Ltd. (182,582).—Private company. Registered on June 21st. Capital, £2,000 in £1 shares. To carry on the business of casters in steel, non-ferrous metals, aluminium and cast-iron pattern makers, machinists, smelters, dealers in metals, &c., in Birmingham and elsewhere. The first directors are: F. Shutt, "Sunnyside," Broad Road, Acocks Green; W. Shutt, senr., "Sunnyside," Broad Road, Acocks Green; D. Pitt, 18, Cambridge Road, Thornaby-on-Tees. Qualification: 1 share. Remuneration as fixed by the company. Registered office: King's Road, Hay Mills, Birmingham.

Northern Wireless College, Ltd. (N.I.30).—Private company. Registered in Belfast June 19th. Capital, £300 in £1 shares. To adopt an agreement with J. P. Digby and S. R. Walker, and to take over the business of the Northern Wireless College. The first directors are: J. P. Digby, The West, Galway, electrical engineer; S. R. Walker, 15, Laburnam Gardens, Kew, wireless instructor; G. Davies, 48, University Avenue, Belfast, wireless instructor; P. J. Harton, 11, Woodcot Avenue, Belfast, wireless instructor. Registered office: 8, Corporation Street, Belfast.

Dunmurray Electric Light and Power Co., Ltd. (N.I.32).—Private company. Registered in Belfast June 20th. Capital, £3,000 in £1 shares. To carry on at Dunmurray and elsewhere in Antrim and Down the business of an electric light company. The first directors are: H. M'Cleery, Oakhill, Dunmurray, director; D. P. Gaussen, The Hill, Dunmurray, M.D.; A. H. Henderson, The Park, Dunmurray. The Milfort Weaving Co., Ltd., and the Northern Banking Co., Ltd., have the option of appointing a director. Qualification: 30 shares. Secretary: J. Beatty. Registered office: Dunmurray, Co. Antrim.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Reeve & Bayman, Ltd.—E. H. Hawkins, of 4, Charterhouse Square, E.C., was appointed receiver on June 13th, 1922, under powers contained in first mortgage debenture dated December 17th, 1921.

Elco Electric Manufacturing Co., Ltd.—Particulars of £4,500 debentures authorised June 12th, 1922; charged on the company's undertaking and property, present and future, including uncalled capital; whole amount issued.

Bell Battery Co., Ltd.—Debenture dated June 12th, 1922, to secure £800, charged on the company's property, present and future, including uncalled capital. Holder: O. W. Seligman, 52, New Broad Street, E.C.

Stella Lamp Co., Ltd.—Particulars of £23,500 debentures authorised May 15th, 1922, charged on the company's undertaking and property, present and future, including uncalled capital; whole amount issued.

CITY NOTES.

J. G. White and Co., Ltd.

According to the *Financial Times*, the profit for the year ended February, 1922, was, £11,154, plus £13,193 brought in making £24,347, which has been used in pursuance of the scheme for reduction of capital. The nominal capital was reduced from £500,000 to £350,000 by writing off from each of 200,000 issued ordinary shares of £1 each the sum of 15s. per share. £150,000 was written off from the debt due by J. G. White Commercial Co., and £100,000 has been received from that company in cash, reducing the balance of its debt to £84,000. As a part of the scheme for reduction and re-organisation of capital, 50,000 of unissued ordinary shares of £1 each were sub-divided into 200,000 ordinary shares of 5s. each, and these shares, since the date of balance sheet, have been allotted at par. Preference shareholders have accepted an arrangement, waiving their cumulative rights for a period of three years ending August 31st, 1923. General conditions have slightly improved, and with reorganisation of the capital position all debts have been provided for and the directors look forward to successful continuance of the company's activities.

Globe Telegraph and Trust Co., Ltd.

Sir John Denison-Pender, G.B.E., presided at the annual meeting on June 20th. The chairman said that it was his pleasing duty to present even better results than those of the previous year. The net receipts had increased by £42,374 to £330,146.

When the agreement between the Direct United States

Cable Co. and the British Government expired in 1923 the Globe Co. would receive £6 per share for its holding in the company; this would enable it to repay the £30,000 which was borrowed for the purpose, and also leave a margin of £30,000 for investment. The returns from American investments, such as the American Telegraph & Cable Co., the Commercial Union Telegraph Co., the Mackay Companies, and the Western Union Telegraph Co., all showed reductions, but this was not due to a reduction of dividends, but to the improvement in exchange, representing a loss of £2,000 as compared with last year's income from American sources. The receipts from the Great Northern Telegraph Co. also showed a reduction due to the lowering of the dividend from 24 to 22 per cent. The lower income from the Submarine Cables Trust was due to the drawing of fifty-three 6 per cent. certificates, the proceeds of which were re-invested in Eastern Telegraph ordinary, and Eastern Extension and Western Telegraph shares. None of these losses was serious. On the other hand the full year's dividend on the new investments referred to brought in £58,000, which entirely dwarfed the losses mentioned. The working expenses of the company had been characterised as heavy, but the chairman pointed out that in such a company this was inevitable, for several reasons.

The report and accounts were adopted.

Great Northern Telegraph Co., Ltd., of Denmark.

In their report for 1921 the directors report that during the year they succeeded in repairing two of the three cables which were interrupted in waters where, a year ago, it was too dangerous to navigate on account of mines, viz., one Anglo-Danish and one of the Franco-Danish cables, the repairing of the latter being especially difficult and costly. It has not yet been possible to repair the cable between Petrograd and Libau. The Russian Government is, however, taking the necessary steps to clear the mines from the area where the cable is broken, and there are good prospects of its being repaired this summer. The company has also had to deal with 21 interruptions on eight of its cables in Europe, and 12 interruptions on 5 cables in the Far East. The cable steamer *H. C. Orsted* has been occupied in European waters for 253 days, of which 12 have been for the account of other administrations, whilst in the Far East the *Store Nordiske* and *Pacific* have been in commission for 191 days, including 120 days on which they were chartered by other administrations. Both the Russian Government and the company have done everything in their power to re-establish telegraphic communication between Europe and the Far East *via* Siberia. The company dispatched an expedition which traversed the whole of the route from Petrograd to Tchita and Kiachta, and supplied the telegraph stations on the way with instruments, batteries, accessories, &c., necessary for the re-opening of the service. Whilst the telegraph lines through Russia and Siberia are maintained in good condition by the Russian Government, it is at present impossible to establish communication between the Russian telegraph system and the cables and landlines in the Far East either *via* Vladivostock or *via* Kiachta owing to the total interruption of both these routes. The restoration of the Vladivostock route is hindered by the state of war existing between the Governments of Tchita and Vladivostock, whilst the restoration of the Kiachta route is dependent upon the Governments of Peking and Urga succeeding in arriving at an agreement, which, in spite of protracted negotiations, they have not yet been able to do. Under these circumstances the company has had to fall back upon another scheme, which became possible of realisation thanks to the facilities granted by the Russian and Chinese Governments resulting in the establishment of a quite new route by means of a wire placed at the exclusive disposal of the company by the two administrations between Irkutsk and Peking *via* Blagowestschensk—Helampo—Harbin, and worked in connection with the company's direct wire between Petrograd and Irkutsk. A repeater station, equipped by the company and manned by Danish operators, has in this connection been established at Harbin. Communication was thus re-established on March 26th this year after an interruption lasting nearly four years. Although it is quite likely that some difficulties will present themselves, especially until the old route *via* Kiachta is again restored, it is particularly gratifying for the company again to be able to take part in the transmission of telegrams between Europe and the Far East over its own route.

The company's negotiations with Russia have been brought to a successful issue, and in the course of the summer an agreement covering a long term of years was signed whereby the company is enabled to renew its former activities in Russia. Although the preparations necessary for the re-opening of the company's telegraph office at Petrograd proved, in many ways, very difficult, as well as long and costly, the company was, nevertheless, able to re-establish telegraphic communication with Petrograd on January 18th, 1922. The concession which has been granted by the Russian Government binds the company to open a telegraph station at Moscow, thereby placing the Russian capital in direct telegraphic communication with the company's European cable system. Various causes have, however, hitherto prevented the carrying into effect of this undertaking. The Russian terminal traffic exchanged with Western Europe and Amercia is, so far, quite inconsiderable as compared with the corresponding traffic in pre-war times; although some increase has been noticeable of late, the traffic is, however, still so small that the revenue derived therefrom is at present not sufficient to cover the working expenses. Negotiations with England and Sweden in connection with a prolongation of the company's concessions in these two countries have been carried on during the year under review, but have not yet been brought to a final conclusion. Preliminary discussions with the Chinese Government were commenced last year by the company in conjunction with the Eastern Extension, Australasia & China Telegraph Co., with the object of obtaining a prolongation of the existing agreements between China and the two companies. Owing, however, to the decision come to by the International Conference in Washington to include the question of telegraph communication in China amongst the items for discussion there, it became necessary temporarily to suspend the companies' own negotiations in Peking pending the receipt of information as to the result of the Washington discussions. A new cable steamer, destined to replace the *Store Nordiske*, is now being built at a Danish shipyard (Nakskoy Skibsvaerft) for delivery in the course of the summer. At the invitation of the Lettish Administration a Telegraph Conference was held at Riga last September, attended by representatives from all the countries bordering on the Baltic Sea, as well as from England, Norway and the company. The principal object of the conference was to decide on the telegraph rates to be applied between the various administrations represented.

The directors refer to the death of Commodore E. Suenson, already reported in these pages.

The financial result of the year's working, notwithstanding the decrease in the traffic, has been satisfactory. In spite of the fact that the net profit is about 32 per cent. less than the previous year, and that the traffic as a whole does not as yet show any tendency to increase, but rather the reverse, the directors recommend the payment of a total dividend and bonus of 22 per cent., a decrease of only 2 per cent. as compared with last year. The reserve fund will be credited with the usual amount, £33,333, and it is proposed to contribute £55,555 to the pension fund of the staff, and to carry forward about the same amount as the previous year. The traffic receipts, &c., are about £533,670 less than the previous year. This is mainly due to the item gain or loss on exchange, showing the considerable drop of about £395,700. The company's income from foreign currency during the financial year has been taken into account in Danish currency at a rate of exchange fixed at the beginning of the year, and at the end of the financial year a gain, or a loss, on exchange has been allowed for in all cases where the said foreign currencies actually corresponded to a higher, or lower, amount in Danish currency than the rate of exchange fixed at the beginning of the financial year. The above-mentioned large decrease in traffic receipts is partly counterbalanced by a reduction under expenditure of about £331,625. The latter decrease is mainly accounted for by only £116,980 having been taken from the year's income to meet the payment of taxes, as against an amount of £416,666 for the previous year. Leaving the question of taxes out of consideration, the actual working expenses show a decrease of about £32,000 only, but even this slight sign of a return to more normal conditions is certainly worthy of note.

United River Plate Telephone Co., Ltd.

The annual meeting was held on June 20th. Sir Frederick Green, K.B.E., who presided, said that although the gross revenue had increased it did not compare well with the increase of the previous year, principally because profit on exchange had practically disappeared. As regarded telephone revenue only, the increase of £123,824, or 12 per cent., was more satisfactory; unfortunately, however, working expenses had increased in a greater proportion. The money invested in plant had increased by £458,230 to £3,812,360, a very large total, which should add to the strength and security of the company's position. The high value of stocks of material (£358,697) was almost entirely due to purchases in connection with the Buenos Aires automatic scheme. The reserve for renewal of plant now amounted to £1,329,228, which was not too large considering the amount of plant investment.

Last year he had stated that permission to increase rates had been withheld by the Government; the position was still much the same. The Government failed to realise the present high costs of working a telephone business. These high costs had been reflected in the accounts, where it would be noticed that there was no balance available for the usual reserve appropriation. It would be brought home to the Government that no further considerable extensions could be made until increased rates were forthcoming, as without these the present rate of dividend could not be paid on the extra capital required.

During the year extensions to many of the C.B. manual exchanges had been completed. The Rosario automatic exchange and other exchanges had also been extended. Two additional automatic installations had been opened at Cordoba and Rosario. This new plant enabled the company to increase the number of stations from 83,602 to 97,274, but

notwithstanding this there was still a large number of prospective subscribers awaiting connection, and until the automatic exchanges were opened the number could not be reduced.

In July, 1921, the company took over the important Bahiense system operating in the city of Bahia Blanca and neighbourhood, and it was now engaged in consolidating the system with the general system. It had not been possible, however, to connect this south-western part of the province of Buenos Aires with the Federal capital, although it was hoped to do so before long.

Though trade conditions in Argentina were not of the brightest, the outlook from the telephone point of view was most encouraging; this was borne out by the large section of the public still awaiting service. The telephone was regarded as a necessity, and not as a luxury, and to foster and encourage this growing general use of the telephone a constantly increasing capital was necessary. Notwithstanding the question of rates the company's relations with the National Government continued most cordial, and the same could be said with regard to the provincial and municipal authorities. The operations of the company were becoming so important that it was considered desirable that frequent visits should be paid to Argentina, and Mr. Percy Cross, who had accepted the position of deputy chairman in place of Sir John Gavey, was going to Buenos Aires in August, accompanied by Mr. Dawborn, the London manager.

With regard to the current year, the chairman thought that he was justified in anticipating that the present rate of dividend would be maintained on the present capital. Unless adequate rates were permitted the company could not embark upon further extensions requiring fresh capital. The present rates had remained unchanged since they were fixed some thirty years ago, despite the fact that materials, wages, rates, and all expenses had risen enormously in the past few years.

The motion for the adoption of the report and accounts was seconded by Mr. Percy Cross and carried.

The Imperial Tramways Co., Ltd.

The report of the directors for the year 1922, contains the usual review of the operations of the Middlesbrough, Stockton & Thornaby Electric Tramways, the Bristol Tramways & Carriage Co., Ltd., and the London & Suburban Traction Co., Ltd. The company's revenue account shows that the interest on the debenture stock for the whole year and interim dividend on the preference shares in respect of the half-year to June 30th last, amounted together to £13,650, and after placing £9,000 to the reserve fund for depreciation and contingencies, a final dividend of 6 per cent. per annum on the preference capital (less income tax) paid January 2nd last, absorbed £4,200; a dividend for the year of 4 per cent. on the ordinary capital (less income tax) requires £5,600, and there is carried forward £283.

Shropshire, Worcestershire and Staffordshire Electric Power Co.

The annual meeting was held on June 22nd. Mr. W. L. Madgen, who presided, said that owing to the coal strike the volume of business and net profit had decreased, but they were better than in 1919. Referring to the inquiry into the supply of electricity in the South-West Midlands, he said that the Electricity Commissioners had approved an arrangement by which the company and Birmingham Corporation would set up an advisory committee to administer supply in the area. If this was approved at the second inquiry, being held on June 29th, it would be put into effect immediately the Electricity (Supply) Bill, now before Parliament, was passed.

Application had been made to the Treasury to guarantee the expenditure which would be involved in erecting a power station on the Severn and a decision was expected shortly.

Whitehall Electric Investments, Ltd.

The statutory meeting of this company was held on June 20th, when the Hon. Clive Pearson presided. The chairman stated that the company was formed to take over the interests in various South American electrical companies of the Whitehall Securities Corporation, Ltd. Some particulars of these companies were contained in the original prospectus, which was summarised in our issue of April 7th, 1922. Mr. Pearson gave additional details of the company's holdings.

The Compania Chilena de Electricidad was registered as a Chilean company in 1921. Its bonded debt was £3,750,000 8 per cent. first mortgage debentures; of these the investment company held £3,140,000, or 84 per cent. The company's issued share capital consisted of £2,250,000 8 per cent. participating preference shares, and £6,000,000 ordinary shares; the investment company held 68 per cent. and 80 per cent. respectively. The investment company's Chilean holdings represented over half the total of the investments.

Turning to the Mexican companies, the chairman said that in spite of all its political and financial misfortunes, Mexico was one of the richest countries in the world, and it had an unlimited future. The demand for the supply of electric energy was constant and growing, and with the abundance of water-power available the business of electricity supply was a great and growing industry. The present issued capital of the Tampico Co. was £500,000 7 per cent. first mortgage debentures, of which the investment company held 95 per cent., and £775,000 8 per cent. cumulative preference shares, and £775,000 or ordinary shares, the company holding 82 and 83 per cent. respectively. The holdings in the Puebla Co., owned through a subsidiary holding company, were $2,042,810 5 per cent. prior lien bonds, $2,457,000 first mortgage bonds, and $49,500 ordinary shares, representing respectively 48, 65, and 76 per cent. of the total issues.

The investment company held 65 per cent. of the issued capital of the Vera Cruz Electric Light, Power & Traction, Ltd., and the whole of the capital of the two companies operating in Orizaba and Cordoba.

Brisbane Electric Tramways Investment Co., Ltd.

Mr. H. R. Beeton presided at the annual general meeting, held in London on June 21st. In reviewing the working of the Brisbane Tramways Co. he said that the total receipts were £566,073, and the net profit £92,352, giving, with £23,461 brought forward, an available balance of £115,812. Of this amount £100,000 had been devoted to a dividend payment and £15,812 carried forward. Although the traffic and traffic receipts had increased there was a decrease in profit owing to the refusal of permission to the company to raise its rates to meet increased wages. When the Tramways Purchase Act was passed in 1920 it was anticipated that the authorities would acquire the tramways in the autumn of that year, and accordingly the company commenced to obtain a valuation of the undertaking. The Government also appointed experts, in conjunction with whom the company's valuers worked. Before the task was completed, however, the Government experts withdrew. Nevertheless, the company continued the valuation, and ascertained that the replacement value of the company's property, apart from the commercial value, was £1,738,257. In January of this year Mr. Blundell, on behalf of the local board, discussed with the Home Secretary a scheme for the constitution of a trust to acquire and work the tramways on behalf of the local authorities. The negotiations had resulted in the drafting of a Bill which was to be introduced into the Queensland legislature in August. This Bill should furnish a basis for settlement, which, if carried out fairly and in good faith, would prove satisfactory to both the company and the local authorities.

Mr. Badger's state of health had compelled him to give up his position as managing director, but he had been retained as technical adviser.

Richardsons, Westgarth and Co., Ltd.

In the course of his speech at the annual meeting of this company, Mr. D. B. Morison stated that the financial position of the company generally was at present better and stronger than ever before in its history. The three works were exceptionally busy during 1921. The company supplied steam turbines or Richardsons' reciprocating engines to twenty-five vessels, this machinery representing an aggregate of 74,480 h.p. Including turbines supplied for land purposes, their aggregate for the year reached 105,330 h.p. With regard to Diesel engines they had now arranged to build, and were building, engines of the Beardmore-Tosi type. Speaking of the low ebb to which the engineering industry generally was being brought by the chaotic condition of the markets abroad and the excessive cost of production, the speaker said that all the elements of manufacturing costs —labour, material, local rates and other charges—were traceable to high wages, shortened hours and reduced working efficiency.

French Companies.

The *Société Electro-Métallurgique de Saint Béron* has declared a dividend at the rate of 25 fr. per share for 1921, out of net profits of 225,000 fr.

The report of the *Compagnie Electro-Mécanique* states that the extension programme which was decided upon when the Société Westinghouse was absorbed has now been carried out. During 1921 the works were occupied almost on a normal scale; the orders received were mostly for generating sets with steam turbines, and for general electrical plant, while eleven winding engines of large powers were ordered by various mines. Large orders were recorded for fixed plant for the Compagnie des Chemins de Fer du Midi, these comprising static transformers, rotary converters, mercury vapour rectifiers, synchronous compensators, &c., all of which represented about 250,000 kW. Train lighting equipments to the number of 3,000 had been ordered by the Paris-Orleans, the Northern, and the Alsace-Lorraine railways. A dividend at the rate of 8 per cent. out of net profits of 5,482,000 fr. was declared at the recent general meeting.

The *Société d'Electro-Chimie et Electro-Métallurgie* reports that the net profits in 1921 amounted to 2,127,000 fr., and the dividend is at the rate of 5 per cent. In 1920 the net surplus was 3,709,000 fr., and the dividend at the rate of 9 per cent.

The *Compagnie Générale des Cables de Lyon* reports net profits of 842,000 fr. for 1921, the sum available for disposal rising to 1,357,000 fr. with the balance forward. At the recent meeting a dividend at the rate of 50 fr. was declared on the old capital, and 31.25 fr. per share on the new shares.

The *Société des Forges et Ateliers de Constructions Electriques*, of Jeumont, states that great activity was displayed

at the works in 1921, and the value of the turnover exceeded one hundred millions of francs. The net profits and balance forward amounted to 11,057,000 fr., and it has been decided to pay a dividend at the rate of 10 per cent. on the ordinary shares.

The *Compagnie Générale de Télégraphie Sans Fil* reports that the directors in 1921 continued the organisation of a great network of radio communications between France and most other countries. In Europe several conventions were concluded. Thus agreements were entered into with the Société Romaine Radioelectrica—which is now the Société Radioromana—with the State of Czecho-Slovakia and the Société Marpendante Belge de Télégraphie sans Fil, as well as with various foreign companies interested in the establishment of transmarine wireless communications required by the South American Republics. In Asia an agreement was signed with the High Commissariat in Syria for the construction and working of a station near Beyrout, while in the Far East an agreement was entered into in regard to the large Saigon station, and it was hoped that direct communication between Paris and Saigon would be instituted in 1922. The net profits earned in 1921 reached 4,967,000 fr., permitting of the payment of a dividend at the rate of 40 fr. per share.

Prospectus.—*London Underground Railways.*—On Monday last the prospectus of the London Electric Railway Co. and the City & South London Railway Co. was advertised. It offered at £94 per cent., issues of £1,000,000 in the former, and of £1,500,000 in the latter, company, in the shape of 4½ per cent. redeemable second debenture stock, 1942-72. The proceeds are to be applied toward (1) the construction and equipment of the Edgware and Hampstead Railway, forming an extension from the terminus of the Hampstead section of the London Electric Railway at Golders Green, to Hendon and Edgware; (2) the construction of connecting railways at Camden Town, to enable a through service of trains to be worked between the City & South London Railway and the London Electric Railway; and (3) the enlargement of the tunnels of the City & South London Railway, the improvement of the stations on that railway, and the provision of new rolling stock and equipment. The list was to close on or before yesterday (29th).

Stock Exchange Notices.—Dealings in the following have been specially allowed by the Exchange Committee under Rule 148a.

Calcutta Electric Supply Corporation.—£90,000 5 per cent., first mortgage, convertible (registered) debentures, Nos. 6,001 to 6,900 (£100), free of income-tax.

The undermentioned securities have been ordered to be officially quoted:—

Calcutta Electric Supply Corporation.—£90,000 5 per cent. first mortgage convertible (registered) debentures (free of income tax), Nos. 6,001 to 6,900 (£100).

Johnson & Phillips.—437,500 ordinary shares of £1 each, fully-paid, Nos. 1 to 437,500.

Calcutta Tramways Co., Ltd.—The directors' report for 1921 states that after meeting debenture interest and preference dividend it is proposed to pay a dividend on the ordinary shares of 3 per cent. for the year, free of tax, placing to reserve for depreciation £45,000, and contributing to staff provident fund £1,799, carrying forward £12,095. The scheme of new fares was brought into force on February 1st last, and effect is shown in an aggregate increase in receipts for 1922 to date of over three lakhs of rupees, compared with the same period for 1920, the period in 1921, owing to the strike, not being a fair comparison.

Montreal Power Companies.—The Montreal Light, Heat and Power Consolidated Co. announces a dividend of 1¼ per cent. on capital stock, and the Montreal Light, Heat and Power Co. a dividend of 2 per cent. on the common stock. The accounts of the Montreal Water & Power Co., according to the *Financial Times*, show for the year ended April, 1922, a gross profit of $561,856, and a net profit, before providing for income tax, of $79,465. Dividends absorbed $54,600, and with $591,814 brought in the balance carried forward is $616,680.

Companies Struck off the Register.—The names of the undermentioned companies have been struck off the Register, and they are thereby dissolved:—

Bright's Light & Power, Ltd.
Drycells, Ltd.
Electric Floor Machine Co., Ltd.
London & Provincial Electric Co., Ltd.

Eastern Extension, Australasia & China Telegraph Co., Ltd.—Interim dividend for the three months ended March 31st of 5s. per share free of income tax.

Edgar Allen & Co., Ltd.—Final dividend of 6d. per share on the ordinary shares, making 5 per cent. for the year free of tax. Carried forward £20,067.

Altrincham Electric Supply, Ltd.—Dividend of 7½ per cent. on the ordinary shares for 1921.

The A.E.G. Capital.—The daily Press reports that at a general meeting of the Allgemeine Elektrizitäts Gesellschaft on Saturday it was decided to increase the capital by an amount up to 250,000,000 marks.

Richard Johnson, Clapham & Morris, Ltd.—Dividend at the rate of 2½ per cent., less tax, on the ordinary shares for the half-year ended March, 1922. Carried forward £23,520.

STOCKS AND SHARES.

TUESDAY EVENING.

THE Bank of England is expected to reduce its rate to 3 per cent. either this week or next, and, in anticipation, gilt-edged stocks are generally a little better. At the same time, the expectation has had little effect in the way of promoting increased business in the Stock Exchange, where most markets remain quiet and colourless. This week's incidence of the fortnightly settlement showed that there is still something of a bull account left in Home Railway stocks, though the position has certainly been reduced. The event in this particular market is the issue of the prospectus of the London Electric Railway Co., offering a million pounds 4½ per cent. redeemable second debenture stock, 1942-72, and the City and South London Railway's offer of 1½ million pounds similar stock, both at 94. The stocks are guaranteed as to principal and interest by H.M. Government, and the issue comes out under the auspices of the Bank of England. Both stocks are, of course, investments authorised for trustees.

There is no doubt about the soundness of the security, but many people will probably think that the price is quite high enough, and it is possible, therefore, that the underwriters may get left with a certain proportion of their obligations. As the stocks become settled into the hands of permanent holders, no doubt the price will improve if, and as money becomes cheaper. There are, however, a good many trustee stocks on offer at the present time which pay a slightly higher rate of interest, the War Loan, for instance, yielding 5 per cent. on the money, though in this case the possibility has to be considered of redemption at 100 in 1929.

The newcomer has had no particular influence over prices of the existing stocks in the electric combine. The new Metropolitan 5 per cent. preference still obtainable in scrip-form, stands at 96, this also being a trustee stock, though carrying no Government guarantee. Metropolitan ordinary stock lost 10s. at 45 and Districts remain at 35¼, the latter failing to recover from their sharp fall of the previous week. The Underground Company's stocks are quiet, showing no changes.

Anglo-Argentine Tramways second preference at 3¾ have shed the small fraction which they picked up last week. Mexicans, in the absence of any authentic news from Washington or Mexico City with regard to the settlement of the outstanding questions between the two countries, are on the heavy side, Mexican Light & Power first mortgage bonds going back to 74½. The case of the Montevideo Trams was mentioned in the House of Commons the other day, a member asking whether the Under-Secretary for Foreign Affairs had been successful in his efforts to obtain for the tramway the return of its property and funds, sequestered some time back by the national or local authority. The official answer was to the effect that the company's appeal against the action of the municipality is now before the Uruguayan courts, and that, pending the decision of the Senate and of the Courts, representations by the British Government would be out of place.

County of London ordinary shares are a good market at 26s. 3d., which shows a rise of 1s. 3d. on the week. The buying pressure is persistent, and extends to the company's preference shares also. Other than this, there are no nominal changes in the price-lists of electricity shares, though the market remains exceedingly hard. Gains of a point carried South London debenture to 91¼, and South Metropolitan debenture to 87. The South Wales Electrical Power Distribution Co. in its annual report shows a loss of £700 in respect of the year recently ended, and the debit balance at net revenue account of £67,000 is the same as that of a year ago. The company pays nothing on its preference or ordinary shares. It may be remembered that, some little while back, occasion was taken in these columns to point out that the offer of shares from a firm outside the Stock Exchange was at a much higher price than that which ruled in the market itself.

The weakness of Marconis is still a feature in the cable market. The price has fallen away to 2¾ under steady pressure to sell. Dealers in the market admit that they are unable to trace the source of the realisations, but the sales come at a time when people are not anxious to buy. As we mentioned previously, the shares fell into discredit, owing partly to mis-statements, as to the previous price and yield, from sources whence a purchase was vigorously advised. In spite of the near approach of the dividend time, the public are fighting shy of the parent shares, and of others in the

group as well. At 2⅜ the price shows a loss of ¼ on the week: Marconi Marines have drooped to 31s. 3d. Radio common are a guinea and the preferred 15s.

The Eastern Cable group is declaring its usual quarterly dividends, the Eastern Telegraph's 2½ per cent. and the Eastern Extension's 5s. per share, both free of tax, being payable in the middle of next month. Eastern ordinary is a point higher; other prices in this section are without movement. The India Rubber, Gutta Percha, and Telegraph Co. has passed the interim dividend on the ordinary shares. The last time anything was paid on these was two years ago. Henleys are 1/16 better at 2¼. Edisons gave way to 4s. 6d. English Electric preference are a shade harder. General Electrics are again lower at 20s. 3d. The group as a whole however, is quiet, with preference shares in steady request. Amongst the new issues, Calcutta Electric 7 per cent. second debentures hardened to 2½ premium. Madras debenture and Indian Electric debenture have both eased off a little to their par prices. The rubber market is dead, and amongst armament and engineering shares there is so little business going on that prices remain virtually as they were a week ago.

Metropolitan Vickers 6 per cent. prior lien debenture is to be repaid on January 1st next. This will effect a saving of interest to the company, but the ordinary at 24s. 6d. are a few pence down. Victoria Falls ordinary have hardened to 12s. 9d. owing to a general rise in South African shares. The speculative investor is inclined to look kindly upon the company's 6 per cent. participating preference shares at 22s. For some years past, these shares have received their maximum 10 per cent. This may be reduced by reason of the recent disturbances on the Rand, but is likely to be resumed as matters become more settled.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend. 1920.	Dividend. 1921.	Price June 27, 1922.	Rise or fall.	Yield p.c.
Home Electricity Companies.					
Brompton Ordinary	12	12	7¾	—	£8 0 0
Charing Cross Ordinary	8	9	6⅝	—	6 11 0
do. do. do. 4½ Pref.	4½	4½	3⅝	—	5 16 2
Chelsea	6	6	5⅝	—	5 6 8
City of London	14	14	38/9	—	7 4 0
do. do. 6 per cent. Pref.	6	6	22/6	—	5 6 8
County of London	8	8	1⅝	+ 1/16	6 2 0
do. do. 6 per cent. Pref.	6	6	1⅛	—	5 13 0
Kensington Ordinary	9	10	7⅜	—	7 0 7
London Electric	2½	4	2⅛	—	5 17 8
do. do. 6 per cent. Pref.	6	6	4¾	—	6 3 1
Metropolitan	7	7	5⅝	—	6 13 4
do. 4½ per cent. Pref.	4½	4½	3⅞	—	6 0 0
St. James' and Pall Mall	12	12	8½	—	7 1 2
South London	7	7	3¾	—	8 0 0
South Metropolitan Pref.	7	7	1⅞	—	5 18 0
Westminster Ordinary	10	10	7⅞	—	6 15 0
Telegraphs and Telephones.					
Anglo-Am. Tel. Pref	6	6	109½	—	5 16 0
do. Def.	1½	34/6	23¾	—	7 6 0
Chile Telephone	6	6	6 1/16	—	4 15 1
Cuba Sub. Ord.	7	7	8½	—	8 4 8
Eastern Extension	10	10	18½	—	5 8 1
Eastern Tel. Ord.	10	10	188½	+1	5 6 1
Globe Tel. and T. Ord.	10	10	19	—	5 5 3
do. do. Pref.	6	6	11¼	—	5 7 10
Great Northern Tel.	24	22	80	—	7 6 8
Indo-European	10	10	37½	—	6 3 5
Marconi	25	15	22	— ½	6 6 4
Oriental Telephone Ord.	12	12	2 1/16	— 1/16	*4 16 0
United R. Plate Tel.	8	8	7¼	—	*5 8 6
West India and Panama	Nil	Nil	5/-	—	Nil
Western Telegraph	10	10	18½	—	*5 8 0
Home Rails.					
Central London Ord. Assented	4	4	68	—	5 17 8
Metropolitan	1½	2½	45	— ½	5 0 0
do District	Nil	1	35½	—	2 16 4
Underground Electric Ordinary	Nil	Nil	2¼	—	Nil
do. do. "A"	Nil	Nil	6/6	—	Nil
do. do. Income	2	4	81½	—	*4 18 0
Foreign Trams, &c.					
Anglo-Arg. Trams, First Pref.	5½	12½	3⅜	—	7 11 8
do. do. 2nd Pref.	Nil	5½	3⅜	— ¼	7 6 8
do. do. 5 per cent. Deb.	5	5	80	+1	6 5 0
Brazil Tractions	Nil	Nil	52	—1	7 13 10
British Columbia Elec. Rly. Pcc.	5	5	80½	—	6 4 3
do. do. Preferred	5	92/-	69⅝	—	*6 13 0
do. do. Deferred	3	124/-	73	—	*8 10 0
do. do. Deb.	4¼	4¼	79	—	5 7 7
co Trams. 5 per cent. Bonds	Nil	Nil	71½	—	—
do. do. 6 per cent. Bonds	Nil	Nil	87½	—	Nil
Mexican Light Common	Nil	Nil	22½	—	Nil
do. Pref.	Nil	Nil	53	—	Nil
do. 1st Bonds	Nil	5	74½	—1	6 14 3
Manufacturing Companies.					
Babcock & Wilcox	15	16	3	—	5 6 8
British Aluminium Ord.	10	10	⅛	—	—
British Insulated Ord.	15	15	2¼	—	7 1 2
Callenders	15	15	2 1/16	—	7 5 3
,, 6½ Pref.	6½	6½	1⅛	—	5 9 5
Crompton Ord.	10	10	18/9	—	10 13 4
Edison-Swan	10	—	4/6	—	—
do. do. 5 per cent. Deb.	5	5	65	—	7 13 10
Electric Construction	10	10	1⅝	—	7 16 0
English Electric	8	8	15/-	—	6 13 4
do. do. Pref.	6	6	18/9	+6d.	6 8 0
Gen. Elec. Pref.	6½	6½	23/3	+6d.	5 11 10
do. Ord.	10	10	20/3	—9d.	9 17 6
Henley	15	15	2¼	+ 1/16	6 13 4
do. 4½ Pref.	4½	4½	4¼	—	5 2 10
India-Rubber	10	—	1¼	—	—
Met.-Vickers Pref.	8	8	2 1/16	—	6 11 2
Siemens Ord.	10	10	27/-	—	*7 8 2
Telegraph Con.	20	20	26½	—	*4 11 6

* Dividends paid free of Income Tax.

MARKET QUOTATIONS.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general, and they may vary according to quantities and other circumstances.

Wednesday, June 28th.

CHEMICALS, &c.	Latest Price.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... per lb.	8d.	...
a Ammoniac, Sal ... per ton	£63	...
a Ammonia, Muriate (large crystal) ,,	£52	£6 dec.
a Bisulphide of Carbon ... ,,	...	...
a Borax ... ,,	£30	...
a Copper Sulphate ... ,,	£27 10s.	...
a Potash, Chlorate ... per lb.	5d. to 5½d.	...
a ,, Perchlorate ... ,,	7¾d.	...
a Shellac ... per cwt.	£18 15s.	...
a Sulphur, Sublimed Flowers ... ,,	£12	...
a ,, Lump ... ,,	£11	...
a Soda, Chlorate ... per lb.	3½d.	...
a ,, Crystals ... per ton	£6	£1 dec.
a Sodium Bichromate, casks ... per lb.	5¼d.	...
METALS, &c.		
b Aluminium, Ingots ... per ton	£120	...
b ,, Wire ... per lb.	1/9 to 2/6	...
b ,, Sheet ... ,,	1/6 to 2/-	...
p Babbitt's Metal and Anti-friction Metal—		
Grade I ... per ton net	£145	...
Grade II ... ,, ,,	£105	...
Grade III ... ,, ,,	£61	...
c Brass (rolled metal 2' to 12' basis) per lb.	9¼d.	...
c ,, Tubes (solid drawn) ... ,,	11¾d. to 1/-	...
c ,, Wire, basis ... ... ,,	9¼d.	...
c Copper Tubes (solid drawn) ... ,,	1/1½	...
c ,, Bars (best selected) ... per ton	£94	...
c ,, Sheet ... ... ,,	£94	...
c ,, Rod ... ... ,,	£94	...
d ,, (Electrolytic) Bars ... ,,	£71	£1 inc.
d ,, ,, Sheets ... ,,	£145 10s.	...
d ,, ,, Wire Rods ,,	£81	£1 inc.
d ,, ,, H.C. Wire per lb.	10 1/16d.	½d. inc.
f Ebonite Rod ... ... ,,	3/6	...
f ,, Sheet ... ... ,,	3/-	...
n German Silver Wire ... ,,	2/6	...
h Gutta-percha, fine ... ,,	12/6	...
h India-rubber, Para fine ... ,,	10d.	½d. dec.
i Iron Pig (Cleveland Warrants) ... per ton	90/-	...
i ,, Wire, galv. No. 8, P.O. qual. ,,	£25	...
g Lead, English Pig ... ... ,,	£26	...
g Mercury ... ... per bot.	£11 10s. to £11 15s.	5s. to 15s. dec.
c Mica (in original cases) small ... per lb.	3d. to 3/-	...
e ,, ,, medium ... ,,	4/- to 8/-	...
e ,, ,, large ... ,,	10/- to 20/- & up.	...
p Phosphor Bronze, plain castings ,,	1/1	...
p ,, drawn bars and rods ,,	1/3	...
p ,, rolled strip & sheet ,,	1/2½	...
p ,, Wire ... ... ,,	1/3½	...
o Platinum ... ... per oz.	£19 10s.	...
d Silicium Bronze Wire ... per lb.	1/1	...
r Steel, Magnet, in bars ... ,,	1/-	...
n Tin, Block (English) ... per ton	£152 10s.	£2 inc.
n ,, Wire, Nos. 1 to 16 ... per lb.	3/-	...

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

X-ray Victim Honoured.—The name of Dr. Keating Hart, who lived in Paris, has been gazetted in the *Journal Officiel* as having "deserved well of France and humanity." The Order points out that he had specialised for twenty-five years in electrical and X-ray therapy, and had rendered great service in research work. During the war he showed the utmost contempt of danger while attending to the wounded under bombardment. Injured by exposure to X-rays he underwent two operations on his right hand, but, nevertheless, he continued his work until his death on January 25th this year.—*The Times.*

Summer Time.—The Home Secretary announced in Parliament on June 14th, that the Government had come to the conclusion that the period of Summer Time in force this year could not be made permanent. The representations of the agricultural industry against Summer Time operating from April to the end of September (during which the clock is advanced one hour) could not be ignored. Hitherto Summer Time has been enacted from year to year by Orders in Council. A Bill has now been prepared by the Government to provide that Summer Time shall come into operation each year "on the day following the last Saturday in March," and shall last until "the day following the first Saturday in October." It was in moving the second reading of the measure that Mr. Shortt announced that this period would have to be curtailed.

Mr. Shortt, at the close of the discussion, assured the agricultural members that the reduction of the Summer Time period should be not less than three weeks at each end—a concession which was received with cries of protest by other members.

The second reading of the Bill was carried by 207 to 26.

THE GERMANS AND TRADE WITH RUSSIA.

The Possibilities of the Rapallo Treaty.

SINCE referring in this journal a short time ago to the economic situation of Russia, matters in connection with the latter country have advanced a stage by the publication of extracts of a treaty concluded between Germany and Russia. What the Rapallo Treaty will really mean to the contracting Powers must be left for the future to decide. In the meantime attention may be directed to two articles bearing on this question which were published in the Berlin *E. T. Z.* on May 18th. The first is said to be largely based upon statements made by a German official industrial newspaper, while the second is an independent contribution.

Taking the two articles in the order given, it is first recalled that the Soviet control of the export trade and the lack of means of transport and of purchasing capacity naturally place obstacles in the way of the re-establishment of normal economic relations, and it is admitted that these obstacles are not removed by the treaty of Rapallo. But the treaty can and will probably be the basis of joint efforts and appropriate co-operation, and it may induce other countries to enter into similar agreements.

A New Customs Tariff.—The Soviet Republic introduced, two or three months ago, a Customs system in connection with the trading rights granted to the Central Co-operative Association (Centrosojus), which system only possesses theoretical importance so long as communist State administration is carried on. The Customs system, which has been provisionally fixed for a period of two years, is based upon the former Imperial tariff and the levying of duties according to the value and on the basis of the gold rouble.

Actual protective duties only come into question for the industries in which Russia before the war possessed a noteworthy efficiency and which now are in existence in the form of State establishments or establishments released to private individuals, although these are frequently at a standstill owing to the lack of coal and of other raw materials.

The duties on all kinds of means of production, including electrical materials, have been largely reduced as compared with those in force under the former Imperial regime, and in the case of certain goods the duties, in so far as they have already been paid, can be refunded when proof is forthcoming that the imported articles are necessary for the purpose of reconstruction. A permanent tariff commission is constantly to examine the effects of the rates of duties and possibly to propose alterations.

At the same time the Soviet Government is occupied with the division of the National Commissariat for Foreign Trade into two parts—one to be a legislative department and the other a purely mercantile department. The latter is to establish joint State-private companies in association with the new Russian Bank for Foreign Trade, which will probably find activity in the foreign trade with the participation of foreign capital and foreign initiative.

Perhaps the first example in this direction is the reported formation of a German-Russian company, with a share capital of 30 milliards of paper marks. One half is said to be held by the Russian Foreign Trade Commissariat and the Supreme Economic Council, and the other half by the German firms of Stinnes, Krupp, and the Berlin A.E.G.

Electrical Manufacturing in Russia.—The only matters heard of concerning the electrical branch for the present relate to "schemes," although here and there small installations and renewals may be carried out. The news issued by the Soviet newspapers is declared to be substantially distributed for the purpose of propaganda, and must, therefore, continue to be received with caution. As to the activity of Russian electrical manufacturing works, the Russian *Economic Life*, recently published the following obscure statements respecting the month of February, the word programme implying the quantity of production which had previously been arranged to be executed:

The Lampa Works of Moscow carried out 80 per cent. of its programme, with an expenditure of 1,200 kW; the works employed 626 workmen and a staff of 157 on March 1st, 1922.

The Petrograd works of the Siemens-Schuckert Co. produced 2,600 machines, as compared with only 1,600 machines in January. A percentage of 68 of the programme was executed in February, and the number of workmen was 270.

The Svjetlana lamp factory of Petrograd turned out over 36,500 lamps, or 57 per cent. of its programme, but the lack of raw materials was perceptible. The sale of lamps constantly declined and fell from 49,090, in December, 1921, to 34,600 in February, 1922, when the number of workmen was 210.

At the Radio Apparatus Works in Moscow, despite the unfavourable working conditions, the production has recently experienced an increase. In December, 1921, the production was 5 per cent. greater than the previously arranged programme, in January it was 16 per cent. higher, and in February it was 25 per cent. higher.

The Northern Cable Works in Petrograd surpassed its programme by 26 per cent. in February.

The Treaty of Rapallo.—Dr. H. Westenberger, manager of the Literary Department of the Standardising Department at Konigsberg, Prussia, who contributes a separate article to the E.T.Z., deals with the problem from another point of view. He states that through the conclusion of the Treaty of Rapallo the German Government has shown the German merchant (manufacturer) the way towards the future, and has thereby wished to declare to the whole world that the Germans have put an end to the past and resumed their old relations with Russia. The question arises as to how far this goodwill can already bring about practical results. The two commercial parts of the treaty decide that Consular relations shall be resumed and the contracting parties shall mutually grant the most-favoured-nation treatment. These are substantial advances over the agreement of May 6th, 1921, but it will depend entirely upon the attitude of Russia as to how far these advances will be able to produce practical results.

The circumstance which is favourable for German industry is that Russia must chiefly meet her industrial requirements abroad during the next few years. Important industrial regions have been lost in Poland and to the border States, while the industries in Russia herself are so ruined by bad management that an immense amount of capital will be needed to render them efficient again. It is not yet easy to understand how far the Russian State will be able to draw upon foreign capital, but according to the Russian newspapers, a plan exists of devoting foreign credit in the first place to the benefit of agriculture, the restoration of which occupies the primary position in the scheme of reconstruction.

With the export of agricultural products and of Russian minerals it is intended to provide the funds abroad to enable purchases to be made of industrial manufactures, and in this way establish some equilibrium in the national economy. To outsiders this seems to be the simplest and best way towards recovery, as agriculture is really the most important element in Russia. If this plan is adhered to, German manufacturing industries will be able to reckon upon a good business with Russia, provided that that country creates the conditions which are essential for the successful activity of the merchant.

In this respect Dr. Westenberger states that things are still very involved. Plain conditions on the part of the Soviet Government are still lacking as to the paths the merchant can enter upon to-day. The forms of the Russian foreign trade have hitherto been restricted to purchases by the State Commissioners, the representatives of the co-operative associations, the semi-State trusts, and the private individuals who have been granted permission to make purchases abroad.

Difficulties in the Way of Foreigners.—In general, the author states that access to the Russian market is closed to the foreigner, and, for the present, it does not appear as if any fundamental alteration in this respect will be made in the near future, as no settlement has yet been reached between those who are in favour of complete freedom of trading on the one hand, and those who desire the greatest possible restrictions in the admission of foreign merchants, on the other, while at the same time maintaining the foreign trade monopoly of the State.

In the opinion of Dr. Westenberger, firm confidence can be entertained that through the force of facts the Russian Government will be compelled to avoid placing any difficulties in the way of the entrance of foreign merchants into the country, as otherwise no commercial transactions will take place. But some time will still have to elapse before the greatest difficulties are overcome. It has further to be taken into consideration that a stay in Russia, and the journey there, are expensive matters, so that it will, at first, only be possible for very large works and firms to perform pioneer work on their own footing in Russia.

The Konigsberg Fair.—The way to Russia, however, is not closed for these reasons. Exporters will have to make up their minds that matters cannot be precipitated at present, but that action will have to be taken step by step. If it is wished to avoid the great difficulties which are still connected with trading with Russia, it will be appropriate to enter the path to that country *via* the border States. This way, however, leads over the German Eastern Fair, at Konigsberg, upon which devolves an important part for the resumption of trading relations with the East of Europe, since the conclusion of the German-Russian Treaty. This fair has hitherto been an East Prussian and border State fair. The next autumn fair, which will be held from August 13th to 18th, will for the first time also be a Russian fair.

Through the revolutionary transformation of the Russian economic life the Konigsberg fair acquires exceptional importance for the East, as it meets the endeavour of the Russian Government to cover the requirements in manufactures through purchases abroad as far as possible. It is

noteworthy in this connection that M. Krassin recently stated that the State was highly mistrustful of foreign trading representatives in Russia, as it was feared that the State would be cheated by them owing to the absence of competitors. It was more appropriate, M. Krassin said, for the State to make purchases at the big fairs at Leipzig and Konigsberg. This opinion, the German author remarks, is perhaps not individual, but appears to correspond to the general views of leading national economic circles in Russia.

The German Market of the Future.—The autumn fair at Konigsberg will be able to reckon on the support of the Russian Government, and as direct aerial transport services between that city and Moscow have been established, and a direct railway connection *via* Kowno-Dunaberg has now been provided without touching Polish territory, it is expected that numerous Russians will attend the fifth fair at Konigsberg, where also will be found merchants from the border States, who cannot be dispensed with as intermediaries for German-Russian trade, as they know the manifold ways of the frontier trade along which enormous quantities of goods are already to-day passing into the Russian vacuum.

The Konigsberg fair is consequently for German manufacturers of finished products the point where they can start the campaign for getting into the Eastern business. The time is not far distant when German sale prices will have approached the world's market prices and the exports to the high-exchange countries in the West, if they do not cease, will at least be greatly restricted. No doubt the German Government had this matter in mind when the treaty of Rapallo was concluded.

It is, therefore, necessary to provide markets for the future; and the author states that the Eastern market is the market of the future for Germany. There will be many ways of conquering it peacefully, and the Konigsberg fair, where the first feelers can be put out and the first relations entered into, will be an important step in this direction.

Russo-German Electrical Partnerships.—Prof. K. A. Krug has been making a report on the potential participation of the German electrical industrialists in the electrification of Russia. After summarily describing the position before and during the war, and since, showing Germany's role, he was able, just having returned from Germany, to say that in connection with the conclusion of the Russo-German treaty considerable activity developed in German electro-industrial circles. True, the Entente required of the German Government the promulgation of laws preventing the transfer of German capital to foreign countries. Still there can be no doubt that the electrical industry of Germany has at disposal sufficient means to invest in Russia.

With this in view, Prof. Krug initiated negotiations, and at the meetings of the largest German electrical firms, at which he was present, it was laid down that the basic form for the participation of the German electro-technical industry in the Russian market must be the organisation of technical bureaus, with the right of using the technical staff of the German technical firms that were in Russia before the war. The objects of these bureaus would be the repair and supply of reserve parts for electric power stations of public utility. Then the German electro-technical industry might organise in Russia the production of goods not now made there, such as turbines, &c.

The representatives of the German industry expressed their readiness to assist in the development of the Russian electro-technical industry already existing; but expressed a preference to do this under the protection of long-term leases of the factories. On the other hand, the representatives of the People's Foreign Tarde Committee favoured the participation of Germans in the formation of mixed Russo-German companies, expressing, however, a preference for dealing with a German syndicate rather than with individual firms, which would be in a position to make responsible agreements with the Soviet Government for hiring a number of factories.

Prof. Krug, however, rather favoured the formation of technical bureaus in Russia by German electro-technical firms. This would be the simplest form for the investment of German industrial capital in Russia; and at the same time would be the most suitable as the investment of large sums of money requires a preliminary knowledge of the market which could be most successfully acquired by the technical bureaus. The great question, of course, for the Germans would be what Russia could guarantee in the way of disposal of goods. He was of opinion that it would be possible to guarantee to the German companies a certain market at fixed pre-war prices; and for the success of the negotiations he thought these should be conducted in Moscow. A discussion followed the report, and some members present, particularly Polivanoff, thought that the foreign intervention should begin in those spheres of public economy which were competent to improve the position of the country and increase its purchasing power, such as agriculture.

In the end, those of the Government Planning Section present at this meeting resolved that the Chief Electricity Section should draw up a statement on the branches of the electro-technical industry in which it was desired that German capital should take part; and it emphasised the desire previously expressed, that the negotiations with representatives of the German electro-technical industry should be transferred to Moscow.

NEW B.T.H. FEEDER PROTECTIVE GEAR.

For systems where the operating conditions make it either advisable or necessary that the protective gear be discriminating (*i.e.*, that on the occurrence of a fault only the faulty feeder should be isolated), the British Thomson-Houston Co., Ltd., Rugby, has developed a new and interesting form of opposed-e.m.f. feeder protective gear, for which patent protection has been applied for, both for the system and for the apparatus.

The new system has been developed to overcome the defects experienced previously with similar forms of protection, the principal changes being as follows:—

(*a*) A plain ring-cored transformer is substituted for the less efficient air-gap transformer.

(*b*) By furnishing an adequate amount of tripping energy from the transformers, sensitive fault settings are obtained, where required, with plain electromagnetic relays of simple and strong construction.

(*c*) Security from undesired operation is obtained by the introduction of a controlling bias, and distinction is made between earth faults, which require light settings, and phase faults, wherein large currents necessarily flow.

The equipment for each end of the line of a 3-phase system comprises three protective transformers, a biasing transformer, an earth fault relay and a line fault relay, the external connections of which are shown in fig. 1.

The general construction of the biasing transformer is indicated in fig. 3, where it will be seen that the centre limb has two windings, one of which is referred to as the "operating" winding and the other as the "secondary" winding. The former is connected at that point in the circuit where the relay winding would normally be installed, while the latter is connected to the relay. There is a simple transformer action between the transformer windings, resulting thus far in a transformer-operated relay, but additional coils, described as restraining windings, are provided on the external limbs of the transformer, and they are connected so as to cause a magnetic flux indicated by the dotted lines. It will be observed that there is no resultant transformer action between the restraining winding and the secondary winding; the latter is only energised by the flux, indicated in full lines, set up by the operating winding. On the other hand, any current flowing through the restraining winding will tend to saturate the outer yoke of the biasing transformer, and this may very appreciably diminish the magnetic flux linking the operating and the secondary windings, with the result that the ratio of transformation will depend upon the current in the restraining winding.

The object of this arrangement will be made clear by a study of fig. 2, which shows the method of applying the biasing transformer to a single-phase opposed-voltage protective

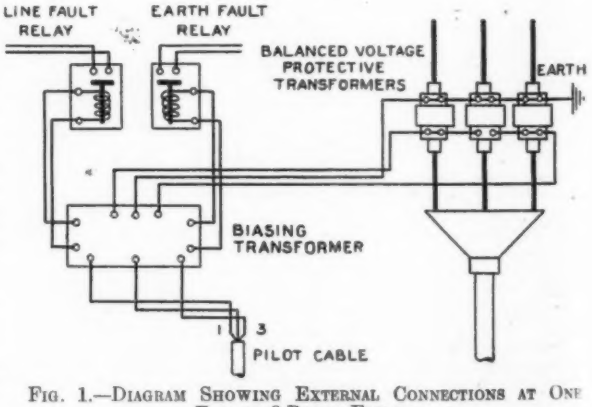


FIG. 1.—DIAGRAM SHOWING EXTERNAL CONNECTIONS AT ONE END OF 3-PHASE FEEDER.

system. The restraining winding is connected across the terminals of the protective transformer, so that it will carry a current whose magnitude will vary with the load on the feeder. The protective relay, on the other hand, is operated from the secondary winding of the biasing transformer and, as the ratio of transformation depends upon the current in the restraining winding, the desired result is obtained in

that the sensitivity of the protective relay can be made to depend upon the load on the feeder. In practice, it is arranged that the amount of restraint is negligible so long as the main current in the feeder does not exceed the normal.

Under heavy overload conditions it will be seen that the biasing transformer performs two very important functions, in that it restrains the relay from operating:—

1. Due to the capacity currents in the pilot wires of a sound feeder.

2. Due to currents in the pilot wires caused by lack of perfect balance in the protective transformers.

These features overcome the defects of systems in which pilot wires are used with balanced transformers and where, in order to obtain satisfactory tripping conditions for the relays, the transformers are invariably constructed with an air gap. Such transformers are essentially inefficient, and, therefore, from the outset, they impose a handicap on the designer, while in addition, they introduce manufacturing variation which renders it difficult to make the transformers interchangeable. The greatest defect, however, is the high setting of the relays which is necessitated by the fact that these have to carry the high capacity current of the pilot wires, which, even under healthy conditions, are charged to a voltage depending on the load that the feeder is carrying. Even with sheathed pilot wires, although the settings are considerably better, it is generally necessary to use a very delicate relay and the other features are not improved.

For the protection of three-phase circuits a further advantage is gained by adopting the connections shown in fig. 4. In this diagram the biasing transformers are omitted for the sake of simplicity, but it will be understood that these are employed for each relay in accordance with the principle indicated in fig. 2, and the complete arrangement shown in fig. 1.

The object of the connections in fig. 4 is to obtain a system in which separate relays with different settings may be employed for earth faults and line faults, so that the maximum sensitivity may be obtained for the former by ensuring that they are not subjected to the relatively large currents which must flow through a line fault relay when, for example, a healthy feeder is conveying a short-circuit current to some point beyond the protected zone under consideration. This is achieved by providing a double-wound transformer at one phase and connecting it in the manner shown in fig. 4.

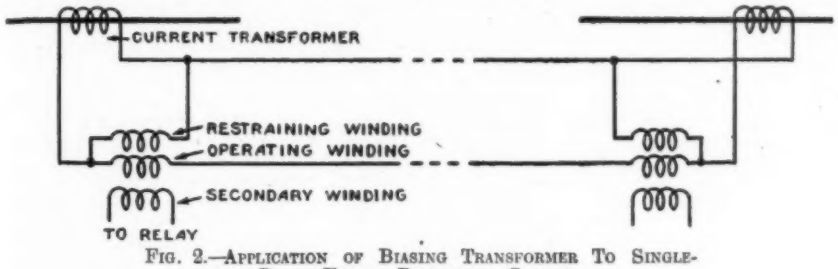


Fig. 2.—Application of Biasing Transformer To Single-Phase Feeder Protective Circuit.

Under normal conditions, the voltages set up at each end of the feeder will balance each other, but pilot wires 1 and 3 will have a potential difference between them, depending on the load current of the feeder, and consequently the line fault relays will carry the capacity current due to this potential. Pilot wire 2 carries no capacity current and will remain at earth potential so long as no leakage current is flowing through the feeder.

On the occurrence of an earth fault on the feeder the balance of the protective transformers is upset, and a current will flow through pilot wire 2 and either, or both, of the pilot wires 1 and 3, according to which phase has become earthed. This current will operate the earth fault relays at each end of the pilot wire 2.

When a fault occurs between two phases, the unbalancing of the protective transformers will cause a current to flow through the pilot wires 1 and 3, and operate the line fault relays.

Although fig. 4 only shows a double-wound transformer on the middle phase, in practice all the transformers are of this type, to facilitate factory production and interchangeability. The transformers on the other phases have the two windings connected in parallel, but for the sake of simplicity this is not shown on the diagram.

In the complete arrangement shown in fig. 1 the biasing transformer comprises two distinct elements, one being associated with the earth fault relay and the other with the line fault relay. The element associated with the earth fault relay is arranged to exert a restraining effect of sufficient magnitude to cover the capacity currents which may flow in line 2, due to remote earth faults, and also to provide a smaller restraint in the event of a heavy overload due to a remote line fault which does not involve breakdown to earth, such conditions being usually accompanied by much heavier currents than those associated with earth faults. This feature also takes care of any lack of balance which may exist between the transformers, there being no capacity currents to deal with. The second element of the biasing transformer applies restraint to the line fault relay under all overloading conditions, sufficient to cover unbalancing or capacity effects. These two elements of the biasing transformer are assembled in one case, arranged as shown in fig. 1, to form a terminal board from which the connections are made to the relays, the protective transformers, and the pilot wires. This is an example of the care that has been taken throughout to simplify the installation and operation of this protective gear.

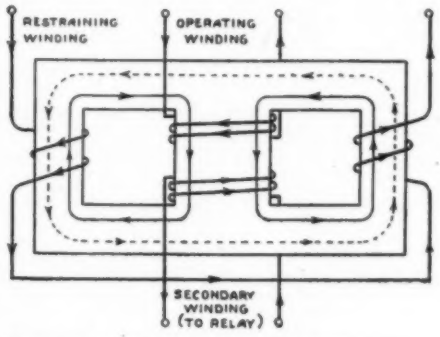


Fig. 3.—Principle of Biasing Transformer.

In conclusion, it may be said that the manufacturers have applied well-known principles in an original manner to obtain a system in which the component parts are both simple and robust. It is claimed that the system can be applied to any a.c. feeder provided that pilot wires are available, and is fully discriminating, so that even when applied to the most complicated network, it will only trip out faulty feeders.

Separate relays are used for earth faults, so that without using sheathed or compensated pilot cables, low settings are compatible with immunity from tripping when a sound feeder conveys a heavy current to a faulty section, which is, of course, assumed to have its own protective gear.

This immunity is largely assisted by the use of the biasing transformer, which increases the relay setting under overload or through leakage conditions, and, at the same time, permits the use of simple and robust apparatus. Thus the protective transformers have a closed iron circuit, and are, therefore, free from external magnetic disturbance, which is liable to affect the operation of air-gap transformers;

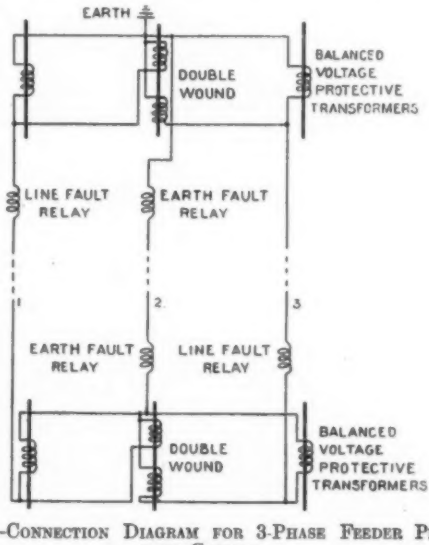


Fig. 4.—Connection Diagram for 3-Phase Feeder Protective Circuit.

interchangeability of tranaformers for a given circuit voltage is assured, and, owing to the fact that they do not operate under open-circuit conditions, the transformers will not be unduly heated. The relay is of the simple electromagnetic type without embodying any restraining coils or magnets,

and, due to the inherently more efficient design of the protective transformers, there is ample power to operate a robust relay at a low setting.

The earth fault relays can be set for between 25 and 50 amperes, depending upon the length of the feeder and the resistance of the pilot wires. This low setting is of considerable importance for earth faults, as the current is usually limited by a neutral earthing resistance. The line fault relays may, without disadvantage, be set for higher values, for example, from 100 to 200 amperes.

THE TRUE ART OF JOB-FINDING.

By THE O'RUDDY.

I SUPPOSE it would be better first to give the reasons why I consider I know enough about this subject to be able to give other people a few tips.

I find on consulting my diary that since the Armistice I have obtained eight permanent and two temporary situations, mostly with electrical concerns, owing to conspicuous ability, intelligence, appearance, &c., and on further consulting my diary I find that owing to unforeseen circumstances I have relinquished nine of them. Forty-seven per cent. of these losses were owing to the divergent points of view of myself and the management, a further 78 per cent. say, friction losses, 23 per cent. not enough money, and the remaining 1 per cent. I got the sack. (Mathematicians will now be able to calculate whether I am out of work.)

I think, therefore, I have a right to claim the Electrical Job Finding Championship, and if I had not an equal right to style myself the Champion Job Loser, I should no doubt be rich. Anyone who wants them, by the way, is welcome to both titles.

But this is not very helpful for those unfortunates who only want to know how to get one job, and who are probably so adhesively constituted as to be able to stick to it for ever if they do get it.

There is really only one channel through which it is possible to obtain a job in the electrical trade, and modesty will probably forbid the proprietors of the ELECTRICAL REVIEW mentioning it. Having, then, looked carefully through the "Situations Vacant" column (or paragraph—lately) choose the advertisements that state requirements most nearly suitable to your attainments and write the best letter of which you are capable, carefully varying your attainments to those required. You will not be able to keep this up for more than a fortnight or so—the composition of letters containing brilliant wit, forceful dialogue and sound argument in favour of the advertiser's engaging you at fabulous fees being most fatiguing—and in course of time your letters will dwindle to a mere catalogue of experiences and virtues, when you may begin to hope. You will also, at first, begin by asking the salary you think you are worth; later you will ask what you think you can get; and finally you will compound with your conscience by offering to take less than that, with the proviso that you get a rise if found satisfactory at the end of a trial month. At the end of the month—assuming you get the job—your employers will be wondering whether to sack you or not, and you will be feeling far too shaky to mention rises, so the salary question will automatically adjust itself.

The box number has put it almost out of the ordinary person's power to find out the views of the person advertising, but from a long and varied experience I think it is as well to be married when applying—a modicum of children will also be useful—and this little matter can easily be put right with your female colleagues later on.

However, we have only reached the writing point so far.

When you have written so many letters that by all the laws of sweepstakery you simply *must* draw a horse, you will one day receive a letter asking you to oblige the writer by calling. You will do so. It is necessary to appear calm during the interview. From long practice I think I may say without boasting that I *am* calm—I reckon to get about 25 per cent. of the jobs for which I obtain interviews—but you will do quite well if you are able to appear so.

At the outer office—if there is an outer office—ask for the man you want in a Sales Manager's voice. If they ask your business say "Private" peremptorily, as though you are astounded at their eagerness to poke their noses into your personal affairs. (This sentence is a bit difficult, as they are—or is—a flapper or an office boy.) You will now be asked to wait, and the best reply to this is to look at your watch with as much noise as possible, which will ensure your getting the next interview. If anybody else appears to be waiting on the same errand as yourself, a certain D'Artagnan de Fairbanks *insouciance* of manner may be helpful in scaring away competition. Stropping a razor on the boot I do not recommend. Cross and uncross your legs frequently—blow your nose—drop your stick—read the paper—laugh at the jokes and leading articles—in fact, give as much evidence as you possibly can of your complete self-confidence.

I remember once nearly scoring very heavily off a nervous-looking young man by means of the *Winning Post*, and should have done so completely but for a tactless and noiseless entry by the Presbyterian Engineer I was waiting to see. Unfortunately he saw me first.

Once inside, however, these tactics must be completely changed. It is of the utmost importance to remember that you are asking the priceless privilege of working for The Only Firm in the World. (No matter if the office is only a seat at a desk while some other firm is out, this is the attitude.) For instance, during one interview I was offered a job at an extraordinary wage.

"Yes," I said, "that'll do nicely," I said, "for my dog's keep," I said, "but where do I come in?"

"But you'll be working for the *Port of Billingsgate Authority*," exclaimed the interviewer, in tones of pious horror, bowing his head as he spoke the awful name. Evidently the privilege is worth many obols weekly—but not to me.

Facial expression must be studied. You should "register" initiative, capacity, ambition, resource in dealing with emergencies, complete knowledge of the business, ardent loyalty to The Firm, and an entire unwillingness to accept any salary whatever. Call your dog to see if he will come, and if he does, kick him with one hand and give him something to eat with the other; he will get it about right.

Be on the alert to answer any questions as you think the interviewer would like them answered. If he asks if you know anything about a.c. motors and you don't, never mind. Say you do. Admit it freely. Time enough to learn if you get the job. Produce your best reference and hand it over as an inferior sample.

If your interviewer should be of the genial, patronising type, he may make a joke. If you suspect this, laugh discreetly in such a manner as to be able to convert it instantaneously into a cough. (Not too harrowing—it may lose you the job.)

Above all things, never betray any gleam of astonishment no matter what absurdity may be uttered—it *will* lose you the job.

I once interviewed the engineer of a large South London electricity undertaking. He said he liked me. I thanked him. He said I had a keen face. I blushed. "But," he said, "we have a pension scheme, and it is a *sine qua non* of your entering our organisation that you join it."

The excitement of being interviewed in Latin was too much for me; my grip slipped, and I lost one of the best expressions I have ever had.

"'*Sine qua non*' isn't a thing you *say* to people," I exclaimed, thunderstruck, "it's in newspapers and the end of the dictionary. I'll turn it up if you like." The rest of that interview has passed from my memory, but on referring to my diary I find no record of ever having worked in South London.

There is, I may say, a short cut to Job Finding, but I can only give it in confidence. An Unscrupulous Person known to me once inserted an advertisement in the "Situations Wanted" column of an electrical weekly, bearing his own name and address. He then wrote a long letter to the Editors on a subject with which he had no acquaintance, and so timed letter and advertisement that they appeared on the same Friday—the result being that he was inundated with offers of jobs and was able to pick one where the Boss was out all day.

"Publicity Pays" seems to be the only moral to this otherwise immoral story, to which might be added "and if you can't afford to pay for it, get it for nothing—if you can."

POWER SUPPLY FOR THE SOUTH-EASTERN AND CHATHAM RAILWAY.

ELECTRICITY COMMISSIONERS' INQUIRY.

(*Concluded from page* 897.)

The final speeches by counsel for the various parties were made on June 14th and 15th. Before that stage was reached, however, the opposition cases for the London Companies' Joint Committee, the Conference of Local Authorities and the London County Council had been presented. None of these, however, carried the matter very much farther, and they appeared to be largely directed to the point that the *status quo* should be maintained for fear that either the Railway Co. or the West Kent Co. should gain an advantage. The most logical, perhaps, of these cases, was that of the London Companies' Joint Committee, which was that the Railway Co. should be prevented from erecting a power station for that particular purpose alone to the detriment of assisting the general supply in accordance with the scheme determined by the Commissioners as the result of last year's inquiry. Mr. Fladgate, the Chairman of the Joint Committee and of the Charing Cross Co., said that what he aimed at was a combination of the existing authorities in two portions, viz., a combination of the local authorities and a combination of the companies. There were strong hopes that the latter would be brought about in the comparatively near future, and he specially mentioned this possibility in relation to the County of London Co., and, in a less pronounced degree, the City of London Co. If that were done, then arrangements could immediately be made to supply the South-Eastern Railway from the Deptford station and subsequently, to meet a large railway load, a new power station would be built.

That was in contemplation if the full combination of the companies could be brought about. In the meantime, if the West Kent Co. was given the right to supply the Railway Co., it would practically be equivalent to giving the Railway Co. power to erect a generating station for railway purposes alone, because the West Kent Co. had said that without the railway load it would not require the power station. He, therefore, asked the Commissioners to refuse the Railway Co. permission to build a station and leave it to seek the best terms from existing authorised distributors. When the question of the Railway Co.'s generating station had been decided, then his companies were prepared to go into the question, with others, of giving a supply, and the Railway Co. could accept what it thought was the best offer.

Mr. Turner, for the Conference of Local Authorities, made a speech, but called no evidence; in contradistinction to the companies who called evidence, but whose counsel made no speeches. Mr. Turner, like the companies, was not in a position to make an offer, but he did not wish to see anything done which would prejudice the local authorities in the future.

Much the same thing can be said for the London County Council, although its position is much the stronger, inasmuch as it is the purchasing authority in the County of London and, in respect of the County of London proposal, has a direct interest in seeing that these rights are not interfered with as the result of the schemes now before the Commissioners.

Mr. Tyldesley Jones, K.C., for the West Kent Co., said that his offer to supply the Railway Co. started at 0.575d. per unit, subject to a rebate of 0.016d. per unit for improved efficiency and to rebates as regarded coal and wages, and the other load on the station. The figure of the Railway Co. was 0.57312d. per unit, delivered at Lewisham. At the very beginning, the price the West Kent Co. offered would be 0.5723d. less the efficiency deduction, and as the general load went up the price to the Railway Co. would get better and better. Thus the price the Railway Co. would pay the West Kent Co. would be continually improving, whereas if it built its own power station the price must remain stationary. Moreover, the power company was not asking for any public credit in respect of the necessary capital for building its power station, and if the power company could supply more cheaply than the Railway Co., with the aid of private capital, then he submitted that it was an advantage that money should be invested in that way instead of driving it abroad for investment.

Mr. Clode, K.C., in the final speech of all, said he first wished to remove the idea that was held by some of its opponents, at any rate, that the Railway Co. did not want to take an outside supply of power on any terms. He claimed that the evidence showed that the Railway Co. had made *bona fide* efforts to secure offers for a supply and had not succeeded. Even the offers received before the Commissioners did not promise the Railway Co. any advantage over what it could do for itself, and if, as was hoped, the Railway Co. could secure powers to dispose of its surplus electricity, then the figures placed before the Commissioners would be improved upon. In his interpretation of Section 11 of the Electricity (Supply) Act, of 1919, he contended that it was within the discretion of the Commissioners to grant the Railway Co. authority to erect a station even if offers had been received for a supply at a decimal place or two lower than the price at which the Railway Co. estimated it could supply itself, because the Commissioners could take the general circumstances into consideration, and have regard to public policy in the matter. There was no compulsion on the Commissioners to refuse the Railway Co. authority to erect a power station merely because an offer had been made which was lower than the cost at which the Railway Co. believed it could supply itself. A case of this kind was not one simply of cost, although on that aspect alone, he was entitled to succeed having regard to the figures that had been put in. Under the Electricity (Supply) Bill now before Parliament, railway companies would be entitled to dispose of their surplus energy, and that would mean a considerable reduction in their costs.

The Commissioners will issue their decision in due course.

THE SOUTH-EAST LANCASHIRE ELECTRICITY DISTRICT.

Electricity Commissioners' Inquiry.

At the Manchester Town Hall, on June 20th, a second inquiry was held by the Electricity Commissioners, represented by Sir Harry Haward and Mr. H. Booth, with respect to the scheme for effecting improvements in the organisation for the supply of electricity in South-East Lancashire,* and for the purpose of finally determining the area of the district.† In opening the proceedings, the Chairman (Sir Harry Haward) said the published scheme‡ gave effect to the conclusions and decisions arrived at by the Commissioners as the outcome of the first inquiry, held in January last.§ Apart from minor amendments it was substantially the same as the scheme then submitted by the South-East Lancashire Electricity Committee. No representations had been made indicating opposition to or criticism of the main principles, but the S.E. Lancashire Electricity Committee and the London & North-Western and Midland Railway Companies had sent to the Commissioners written representations on certain points.

The sections of the scheme were then taken *seriatim*. On Section 4 the Town Clerk of Manchester, who appeared for the Committee, stated that Article 33 in the original scheme authorised the Board to pay on retirement pensions or gratuities. That provision was omitted from the draft scheme. Under the Act of 1919, the Commissioners had power to authorise a scheme of pensions for a Joint Electricity Authority, and he submitted it was equally proper in the case of an Advisory Board.

The Chairman (Sir Harry Haward) said direct statutory authority was required by a public body before it could set up a pensions scheme, and such authority was given by the 1919 Act to a Joint Electricity Authority with the approval of the Commissioners. Parliament having given that statutory authority directly, the inference was that this was not a matter incidental or consequential to the setting up of some other body under a scheme under Sections 5 and 6, The Commissioners had no power to do it.

The Town Clerk suggested that in any amendment or modification of the Act this matter should receive consideration.

The Chairman said he would communicate the suggestion to his colleagues, but he could not say what view they would take of it. It was open to the Committee to put down an amendment to the present Bill, and the Government would have to consider what line it would take.

The Town Clerk pointed out that by Section 6, Sub-Section 2, of the Act, it was permissible to make to members of a Joint Electricity Authority reasonable compensation for loss of remunerative time. It was equally proper that members of an Advisory Board should receive such compensation. Then in the original scheme it was provided that the Board might pay to its members, or to the members of the Engineering Advisory Committee, subsistence and travelling expenses and reasonable compensation for loss of remunerative time. Presumably the members of the Engineering Advisory Committee, being in the employment of a constituent authority, would not sustain any loss themselves, but if an authority placed its engineer largely at the disposal of the Board, it would be equitable that it should receive some compensation for the temporary loss of his services. He would submit a clause dealing with the matter.

The Chairman said the Commissioners had no power to include a provision for compensation for loss of remunerative time as applicable to members of the Advisory Board. It would assist the Commissioners in forming a view upon the subject if they were informed whether there was any strong desire on the part of the Committee for a provision of this kind. As far as the Commissioners' information from other parts of the country went, it was not generally desired. Members of a local authority were not paid for loss of remunerative time, and it was difficult to understand why they should receive compensation for their services in another capacity.

The Town Clerk argued that the Advisory Board should be given the same advantages as a Joint Electricity Authority.

The Chairman said such provision would have to be on the basis of some scale approved by the Commissioners. Speaking from recollection, he thought there was only one case in which such a provision had been proposed in the scheme submitted.

In connection with Section 7, co-option of railway engineers, the Midland Railway Co. submitted a clause providing that when the Engineers' Committee had under consideration any question affecting the interests of the railway companies the Committee should co-opt a railway companies' electrical engineer, to be nominated by the railway companies. The Town Clerk intimated that he was instructed to accept this clause.

The Chairman said it appeared to be a reasonable request. To Section 8 words were added entitling the Stalybridge Board to nominate its engineer for election to the Engineers' Committee.

The Town Clerk said it was desirable that if constituent authorities desired to make new arrangements relating to the supply of electricity their proposals should be considered by the Board. He therefore asked the Commissioners to consider the propriety of inserting a clause which would compel constituent authorities to submit proposals relating to new contracts, or to the transfer of a Provisional Order, or other statutory right to supply. The Board would consider whether the proposals were advisable in the interests of the district and would make recommendations thereon to the authority concerned and to the Commissioners.

*Elec. Rev., September 30th., p. 454; and November 4th, p. 596, 1921.

†Elec. Rev., June 25th, 1920; p. 815.

‡Elec. Rev., April 21st, 1922; p. 553.

§Elec. Rev., January 20th, 1922; p. 97.

The Chairman: This clause would only relate to contracts between constituent authorities?

The Town Clerk: That is the idea, we do not want to trouble the Board with the multifarious contracts between constituent authorities and private individuals.

The Chairman: We see no objection to the proposed clause. It really seems to be an almost necessary addition to the scheme.

The Town Clerk also asked that words be inserted in the order to the effect that no recommendation or decision of the Commissioners should oblige a constituent authority without its consent to do or omit any Act, the doing or omission of which would constitute or occasion a breach by a constituent authority of any contractual obligation existing on June 30th, 1922.

The Chairman said the proposal would receive the most careful consideration. It seemed open to certain objections from the point of view of public policy. It might be questioned whether it was really necessary to have in what would be, in effect, an Act of Parliament, a phrase which suggested that solemn contracts could be broken by some action taken in pursuance of the scheme.

Dealing with a suggestion for the appointment of Advisory Committees, under Section 4 of the Act, the Town Clerk observed that there was an honourable understanding that no action should be taken in the area without the knowledge and approval of the Advisory Committee.

The Chairman said this question had been raised at several inquiries, and had been very carefully considered. The suggested Committee could not be set up under Section 4, but if the present Committee, represented by the Town Clerk, were reconstituted, and made more fully representative of the district, the Commissioners would be willing to consult with it.

Mr. Canning, on behalf of the Midland Railway Co., asked that clauses 14 to 20 should not apply to railway companies.

The Town Clerk said a railway company was an important element in this big industrial area, and the Board should have knowledge of everything that was going to happen electrically to that railway company. There was every desire on the part of the Advisory Board to work in harmony with the railway companies, and to secure co-operation with their engineers.

The Chairman pointed out that the railway companies were not authorised undertakers.

Mr. Armstrong, for the London & North-Western Railway Co., said they would be glad to receive and consider any recommendations made by the Board with regard to their generating station, but compulsory powers would be very objectionable. It was used for railway purposes only.

The Town Clerk said nobody could say what electrical developments would take place in the future.

The Chairman: This is a matter which we ought to put to our colleagues, and they will give it very careful consideration.

In closing the proceedings, the Chairman said this was the first occasion on which the second inquiry had been held under the Act. It seemed probable that this order would be the first to be made and, the Commissioners hoped, in due course confirmed by the Minister of Transport and approved by Parliament.

LEGAL.

British Thomson-Houston Co.'s Patent Actions.

In the Chancery Division, before Mr. Justice Astbury, counsel moved on behalf of the British Thomson-Houston Co. for judgment in four actions in respect of patents. The defendants were: H. Bake & Co., Childs Thomann, and the Empire Electric Lamp Co. Counsel said the judgment was drawn in the usual form, and his Lordship gave judgment for plaintiffs, as asked.

Postmaster-General v. The Liverpool Corporation.

The Court of Appeal, consisting of Lords Justices Bankes, Scrutton and Atkin, on June 26th, delivered judgment upon the appeal of the Liverpool Corporation from a judgment of a Divisional Court, reversing a decision of the Liverpool County Court Judge, who had found against the Postmaster-General upon his claim against the Corporation, and the agreed cost of £40 8s. 7d. for repairing damage done to the Post Office telephone plant by an electric light main belonging to the appellants as the electricity authority of the City of Liverpool.

The electric light cable had been laid in 1889. It was encased in some non-conducting material and further enclosed in an iron pipe. The telephone wire was in an iron pipe, and was adjoining and underneath the electric cable. It had been laid in 1903. On August 6th, 1918, there was an escape of electricity through a breakage in the non-conducting casing material, causing an explosion, which damaged both the electric light cable and the telephone wire. Contrary to the views expressed by the County Court Judge, the Divisional Court held that both on the ground of nuisance and on the ground of debt, the Postmaster-General was entitled to succeed, and from this result the Liverpool Corporation now appealed.

Lord Justice Bankes, in giving judgment allowing the appeal, after stating the facts and referring to the material statutory provision cited during the arguments, said that upon the facts the Postmaster-General could not, in his opinion, occupy any other position with regard to the telephone cable than that of a mere licensee. He thought, therefore, that the Postmaster-General could not succeed upon his claim. Having regard to the finding of the County Court judge, the Postmaster-General must be regarded as a licensee with knowledge of possible damage from the electric main eventually causing the damage and deliberately putting the cable in immediate contact with the electric main. For these reasons he thought the appeal succeeded, and must be allowed with costs there and below, and the judgment of the County Court judge in favour of the Corporation restored.

Lords Justices Scrutton and Atkin concurred.

Weldrics, Ltd., v. Quasi Arc Co., Ltd.

Mr. Justice Eve, in the Chancery Division on June 21st, had before him an action brought by plaintiffs, of Bush Lane House, Cannon Street, E.C., against the defendants, of 3, Laurence Pountney Hill, E.C. Plaintiffs asked for an injunction to restrain the defendants from threatening them by means of circulars, advertisements, or otherwise, with legal proceedings or liability in respect of falsely alleged infringements of patent rights, which defendants claimed to be the owners of or in which they were interested. Defendants, in their defence, denied there was any threat to the plaintiffs.

Sir Duncan Kerly, K.C., and Mr. C. Terrell appeared for plaintiffs, and Mr. J. Hunter Gray, K.C., and Mr. J. Whitehead for defendants.

In opening the plaintiffs' case, Sir Duncan Kerly said the defendants had not suggested that the plaintiffs had infringed their patents. Their case in reply to the plaintiffs' charge of threats was that there was no threat, and there was only a warning. Both defendants were makers of electrodes for welding two pieces of metal together. The electrode used was covered with asbestos. Defendants were possessed of certain patents, but so far as the present case was concerned only one of them was of importance. That was a patent which was an improvement on an earlier patent. The first patent to be referred to was 1,274 of 1912, and the later one was 11,079 of 1912, which amended the previous one with a view to reducing the oxidising of the metal. Some time after this defendants commenced an action against a Mr. Scott Anderson, and as the result of negotiations he elected not to defend the action, which came on undefended. The defendants obtained a judgment against Mr. Anderson, which, counsel remarked, was too wide in its terms. The injunction against Anderson restrained him from infringing the patent or from selling "any metal electrode covered wholly or partly with blue asbestos." These last words, counsel said, were quite unnecessary. Having obtained the injunction defendants proceeded to issue circulars to the trade, in which they stated that all electrodes covered with blue asbestos were infringing patents held by them. This later on came to the knowledge of plaintiffs, and it was seriously interfering with their business. There were only a few firms engaged in making asbestos-covered electrodes, and at least one firm was "bluffed" by defendants' circular, and ceased manufacturing them. Plaintiffs, finding that their customers were frightened, wrote to the defendants, asking whether their electrode infringed the defendants' rights, and the latter, having seen samples, replied that the plaintiffs' covering material appeared to be applied as a paste, and in their view did not interfere with their patent rights. In November, 1921, however, defendants wrote to the Rose Street Foundry & Engineering Co., of Inverness, enclosing a copy of the circular, and pointing out that they were using blue asbestos. The Rose Street Co. were plaintiffs' manufacturers, and their case was that this amounted to a threat against them of legal proceedings in connection with defendants' patents.

Mr. Samuel Hunter Gordon, of the Rose Street Foundry, spoke as to the receipt of the letter enclosing the circular which plaintiffs complained of.

Mr. Andrew Stewart, of Piccadilly, W., a director of the Consolidated Pneumatic Tool Co., Ltd., said the company proposed to take up an agency for the plaintiffs, but, learning of the circular referring to the blue asbestos, he was unable to do business with them.

Mr. J. Hunter Gray, K.C., then opened the case for defendants. At the outset, he said, he was of opinion that the warning issued by the defendants had overstated what was the judgment against Anderson, and he had advised his clients to modify it. They did not propose to send out any similar statements in that form. These remarks, however, did not prejudice the defendants in the present action, and his submission on that was that the plaintiffs had no cause of action, and further, that the circular complained of was in no sense a threat, but a general warning to the trade, and nothing else but a warning.

Mr. Chas. Hy. Champneys, chairman and joint managing director of the defendant company, stated that the Rose Street Co., Inverness, were customers of the defendants, but he was not aware till the correspondence in connection with the action that there was any working connection between them and plaintiffs.

Replying in cross-examination by Sir Duncan Kerly to questions, the witness said he thought he had the sole rights to use blue asbestos, and anybody else using it would be infringing the patent.

Mr. H. F. Dimsdale (secretary to the defendant company), and Mr. Strohmenger (the other managing director), gave similar evidence.

His Lordship, giving judgment, said this was a case which presented a great deal of difficulty, and had he reserved his decision he did not think he would have been in a better position to come to a conclusion. The facts were not really in dispute. In 1921 plaintiffs discovered it was possible to utilise blue asbestos after pulverisation and making it into a paste, for the purpose of covering electrodes. Defendants got to know that these were being put on the market, and in July of that year the plaintiffs took a strong but perfectly straightforward course by writing and asking if they were infringing the defendants' patent. Defendants eventually wrote that the paste did not come within the scope of their patent rights, not knowing that the paste was made of blue asbestos. Later in the year they found that the Rose Street Co. was dealing in blue asbestos, but did not know that that company was intimately associated with the plaintiff company. The result was that defendants wrote that the paste was not an infringement, but if blue asbestos was used they would stand upon their rights and take proceedings. Under those circumstances his Lordship said he did not see how it was possible to hold that the plaintiff company was aggrieved. The circular was a general warning that defendants intended to assert their rights if there was any infringement of their patents. The action failed, and would be dismissed with costs.

Keating *v.* Rumens.

An action came before Mr. Justice Russell in the Chancery Division on June 20th, in which Thomas Keating, of Westcombe Hill, Blackheath, electrical engineer, sought a declaration that a partnership subsisting between him and Percy John Rumens, of Winchmore Hill, N., was dissolved as from November 26th, 1921, and for an order for the winding-up of the business.

Mr. W. Hart, for the plaintiff, said he claimed that the partnership was determinable by notice. He was a certificated electrical engineer, and in 1919 he purchased an electrical contractor's business at the Broadway, Winchmore Hill. Through doing some wiring at the defendant's father's house he got into touch with the defendant, who, in consideration of becoming a partner, agreed to put £500 into the business. The business was carried on as a partnership from September 29th, 1920, until (as plaintiff contended) November 26th, 1921, when it was put an end to by notice from the plaintiff.

The defendant claimed that the partnership was upon the true construction of the deed, for an indefinite time, and that the plaintiff and defendant agreed to continue it until the terms were altered by mutual consent in writing. He contended that the plaintiffs' notice of termination was invalid. He counter-claimed that the partnership was to continue in force down to judgment in that action, and that the agreement should be rectified by substituting a provision that the partnership should not be altered or ended except by mutual consent.

After the luncheon interval, however, it was announced that the parties had agreed to stay all proceedings in the action upon terms, one of which was that the defendant should buy out the plaintiff's interest for £450.

Societe Anonyme International de Telegraphie Sans Fil *v.* Ambaticlos.

In the King's Bench Division, on June 27th, before Mr. Justice Roche, an action was brought by plaintiffs, a Belgian company, against G. E. Ambaticlos, for £871 11s. 4d. rent due of wireless apparatus supplied under an agreement made in July to the steamship *Evangelos*, of which the defendant was alleged to be the owner. The defence was that it was not the defendant who was liable under the agreement, but his brother who was the owner of the vessel. Mr. N. G. Samuels appeared for the plaintiffs, and Mr. Valetta for the defendant.

After evidence had been called in support of the plaintiffs' case, the hearing of the action was adjourned over the Long Vacation to enable further discovery to be made for the purpose of obtaining information as to who was the registered owner of the vessel.

Theft of Electrical Goods.

At Glasgow Sheriff Court, on June 22nd, five men—Wolfe Freedman, Jack Taurff, Peter Murphy, Thomas Dickson, and John Tyler—were charged with having, in concert with another man, between January 1st, 1922, and April 3rd, 1922, on the premises of Messrs. Wood & Cairns (Ltd.), 65, Waterloo Street, Glasgow, stolen 1,774 electric lamps and a quantity of other electrical goods, including switches, cable, key switch holders, adapters, batten holders, wooden blocks, shade carriers, ceiling roses, and an electric iron, the total value being £300. Taurff failed to appear when called upon. His bail was accordingly declared to be forfeited, and a warrant was granted for his arrest. When part of the evidence had been heard it was announced on behalf of Freedman, Murphy, and Dickson, that they desired to plead guilty. A verdict to this effect was given by the jury, who found John Tyler not guilty, and he was discharged. Sentence of three months' imprisonment, with hard labour, was imposed on Freedman, Murphy, and Dickson.

North Metropolitan Electrical Power Distribution Co., Ltd., *v.* Purity Laundry Dyeing & Cleaning Works.

On June 27th this action was heard in the King's Bench Division. Plaintiffs claimed £179 for electric power supplied. Mr. Justice Roche gave judgment for the plaintiffs for the amount claimed, with costs. The particulars will be reported in our next issue.

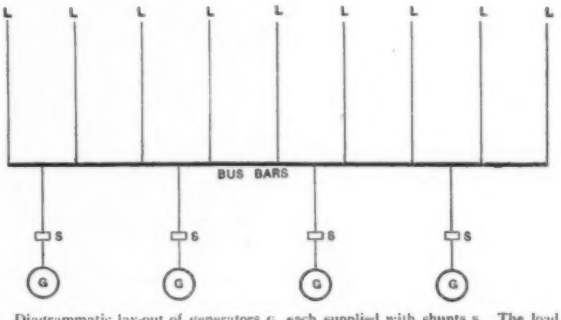
CORRESPONDENCE.

Letters received by us after 5 p.m. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Measuring Total Current.

In connection with the measurement of direct current from a number of machines feeding a set of common busbars, the problem of being able to obtain the combined current value from all the machines by a single ammeter reading has arisen.

One possible solution would appear to be the mounting of



Diagrammatic lay-out of generators G, each supplied with shunts S. The load may be taken off at any or all of the points L as circumstances may require.

several millivoltmeter movements, connected to the shunt on the switchboard of each machine or to a common point.

Through the medium of your journal I hope, therefore, to gain some knowledge from those of your readers who have experienced a similar problem.

The accompanying sketch will make plain exactly what is required.

F. A. Cook.

Newcastle-on-Tyne, *June 20th*, 1922.

Where are the Young Men of the I.E.E.?

In reply to Mr. Moore's letter, I beg to state that one of the chief reasons for our absence from the Scottish and other meetings is the lack of recognition and encouragement by the senior members of the Institution and their "superior" demeanour towards students and graduates. What encouragement does the Institution give to its younger members? In my experience—very little.

At work the student or graduate is rarely recognised by his chief, who is an M.I.E.E., and when applying for a better position, being a younger member of the Institution has no weight whatever, even when the appointment is in the hands of an M.I.E.E.

Until the Institution takes the matter in hand, or the chief engineers, who are members, co-operate and give the younger members—especially those under them—the necessary encouragement and occasional "lift," you will find that the "Young Men of the I.E.E." will always be in the minority at the meetings, &c., of the Institution.

Younger Member.

June 26th, 1922.

The Neon Lamp "Blink."

Noticing the recent correspondence on the neon lamp, I was not under the impression that the blinking was anything to cause discussion. I purchased a neon lamp of the frosted pattern some time ago and found that it blinked when switched off. I changed my main leads over at my distributor box, and the lamp went out, showing that the particular lampholder where the lamp was inserted was alive to earth instead of the switch. I then used this neon lamp as a test lamp, and found on my installation of both lighting and power that some lampholders and plugs were alive and others not. This lamp was a help in remedying these faults, and now everything is O.K., *i.e.*, the neon lamp does not blink on any circuit when switched off.

H. A. Whitehead.

London, *June 27th*, 1922.

PARLIAMENTARY NOTES.

(BY OUR SPECIAL REPORTER.)

Metropolitan Electric Supply Co.—On June 20th Mr. G. Balfour asked the Secretary of State for War whether he was aware that on the 15th November, 1921, the chief valuer of the War Office Directorate of Lands informed the Metropolitan Electric Supply Co. that it was proposed to surrender part of about nine acres of the company's land at Willesden, which had been commandeered without compensation under the Defence of the Realm Act, on the 26th August, 1915; that on the 29th November, 1921, at a personal interview, the chief valuer informed the general manager of the company that the Government was willing to surrender the whole site and reinstate the land, and that although the company's agents had since made repeated applications to the department they were unable to ascertain at what date or on what terms the Government was prepared to surrender and reinstate the land; and whether, in view of the fact that under Section 2 (i) (ii) of the Indemnity Act, 1920, claims for compensation must be lodged with the War Compensation Court by the 31st August, 1922, he would instruct his Department to deal with the matter without further delay.

Sir L. WORTHINGTON EVANS said that the surrender of the site had been delayed pending negotiations as to the possible sale to the company of a siding constructed on the land by the Government. The company having now decided not to purchase this siding, the site was being handed back to it, and it was asked on the 15th inst. to supply details of the basis of its claim for compensation in lieu of reinstatement.

S.E. & C.R. Guarantee.—Mr. WISE asked what security the Government would hold against the advance to the South-Eastern Railway Co., under the Trade Facilities Act.

Sir JOHN BAIRD said that the hon. member was under a misapprehension. No advances were made by the Government under the Trade Facilities Act, which was limited to guarantees of loans raised by the parties concerned. The South-Eastern & Chatham Railway Co. had undertaken to make annual payments sufficient to cover the service of the guaranteed loan.

Empire Wireless.—Mr. HURD asked what was the nature of the contract made between the Australian Government and the Marconi Australian Wireless Co.; had the British Post Office any share in the arrangement; and what means were now proposed to bring Australia into the British Government's Empire "wireless chain."

Mr. PIKE PEASE, Assistant Postmaster-General, said that the British Post Office had no share in the arrangement, except to the extent that the contract contemplated communication with a station in this country, and that for the erection of such a station the co-operation of the British Post Office, in some form or other was necessary. The bearing of the contract on the Empire wireless scheme was under the consideration of the Government.

Mr. HURD asked whether the conference with the Canadian Government regarding the Empire wireless chain, which was announced as about to take place more than a year ago, had yet been held; and what was Canada's present relationship towards the Empire wireless project of the British Post Office.

Mr. PIKE PEASE said that informal conversations only had so far taken place. The Canadian Government would shortly send two technical representatives to discuss the whole subject with representatives of His Majesty's Government, and after these discussions had taken place it would be possible to describe the attitude of Canada towards the Empire wireless scheme.

Water Power for Electrical Generation.—Mr. MILLS asked the Parliamentary Secretary to the Ministry of Transport whether, in view of the continued problem of unemployment and consequent unproductive expenditure on unemployment pay and local relief, he would reconsider his decision not to proceed with the recommendations of the Water Power Resources Committee appointed to consider the utilisation of water power for electrical generation.

Sir W. MITCHELL-THOMSON, who replied on behalf of the Board of Trade, said that legislative authority had recently been obtained, in one case, and in two other cases was being sought in the present session, by the promoters of water-power undertakings.

Private Bills.—In the House of Lords, on June 21st, the London County Council (Tramways and Improvements) Bill, and the Grampian Electricity Supply Bill, were read a second time. The North Metropolitan Electric Power Supply Bill was read a third time and passed.

London Electric Power Charges.—On June 22nd, in the House of Commons, Lieut-Col. ARCHER-SHEE asked the Parliamentary Secretary to the Ministry of Transport, why the charge for electric power supplied by the County of London Electric Supply Co. still remained at 1½d. plus 90 per cent., in view of the reduction in the cost of material and labour; and whether he was aware that there was a general feeling of dissatisfaction amongst the consumers of this company's electricity owing to the fact that the high cost was detrimental to the revival of trade.

Mr. ARTHUR NEAL said that the Electric Lighting Orders under which the company was authorised to supply electricity, fixed the maxumum price which might be charged to consumers. The price mentioned in the question was within this maximum. He had no knowledge as to any general feeling of dissatisfaction. He was informed that representations had only been received from one consumer in London, and one in the Croydon rural district.

Special Orders.—On June 23rd a number of Special Orders, made by the Electricity Commissioners under the Electricity (Supply) Acts, 1882-1919, and confirmed by the Minister of Transport under the Electricity (Supply) Act, 1919, were approved by both Houses.

London and Home Counties Inquiry.—Sir JAMES REMNANT asked what was the cost to the authorised undertakers supplying electricity in the proposed London and Home Counties Electricity District of the inquiry held by the Electricity Commissioners in June and July last, with reference to schemes for the establishment of such an electricity district; and what had been the result of that inquiry.

Mr. NEAL said he understood that the Electricity Commissioners had no information as to the cost incurred by the authorised undertakers at the public inquiry in question. As the result of the inquiry, the Commissioners issued in December last a statement of their decisions, which was circulated to all interested parties, and were now engaged on the preparation of a draft Special Order.

Cost of Electricity Commission.—On June 26th, Sir JAMES REMNANT asked the Parliamentary Secretary to the Ministry of Transport whether, under the Electricity (Supply) Act, 1919, the salaries of the Electricity Commissioners, their staff, office and other expenses had to be paid by the authorised undertakers supplying electricity throughout the country; what those salaries and expenses for the year 1921 amounted to; and whether he was aware that a compulsory levy was now being made on the undertakers to recover them.

Mr. NEAL said that the answers to the first and third parts of the question were in the affirmative. The net cost of the Electricity Commissioners in the financial year 1921-22 was approximately £40,000.

Sir J. REMNANT asked the hon. gentleman if he was aware that since the introduction of this Bill something like £250,000 had been spent by the Electricity Commissioners, which was charged to the authorised electricity authorities throughout the country; and if that was so, how could he expect, with these expenses being piled on them, that they could reduce the price of electricity.

Mr. NEAL said that he could not accept these figures.

Sir J. REMNANT: They are absolutely correct.

Electric Power in Palestine.—On June 27th Mr. MALONE asked the Colonial Secretary whether he had information to the effect that in the early summer of 1920 Suleiman Rabbub and other well-known Bethlehem Arabs applied for a concession for electric light and power, agricultural development, and motor transport in the Jerusalem district and Jordan valley; that they stated that they were already in possession of a capital of half a million and would have no difficulty in raising £2,000,000 or more if necessary; and that Suleiman Rabbub was informed by the administration that no concessions were being made at the time, but that the application would be considered later; whether a report had been received on this application; and, if so, what was its nature.

Mr. CHURCHILL said no information on this subject was on record either in the Colonial Office or in the departments which dealt with the administration of Palestine during the period referred to. The officer administering the Government of Palestine had been instructed to ascertain the facts and report them to him (Mr. Churchill).

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

The "Sims" Small Power Plant.

MESSRS. SIMS & SIMS, Stanhope Terrace, Gloucester Gate, N.W.1, have recently put on the market a compact type of lighting and power plant suitable for country houses or establishments of similar size.

It consists of an engine, which can be operated on petrol, paraffin, or town's gas, coupled to a d.c. generator, together with a battery.

The engine is of the single-cylinder, four-stroke, vertical type. The cylinder is surrounded by a water-jacket connected to a water-circulating system. The connecting rod and crank shaft are manufactured from solid steel forgings. The speed is controlled by a centrifugal governor. The carburettor is of simple construction, consisting of an outer brass casing, at the top of which is an inverted valve of light construction held up to its seat by a light spring. Immediately above the valve seat are air holes covered with an adjustable louvre plate with corresponding holes. The adjustment is effected by hand. Magneto ignition is provided. The dynamo is of a standard type, mounted on the same bedplate as the engine, and directly coupled. The number of cells in the battery ranges from 14 in the three 25-V smallest sizes, to 54 in the four largest (100-V) sizes. The set is made in ten different sizes, including three producing power at 50 V

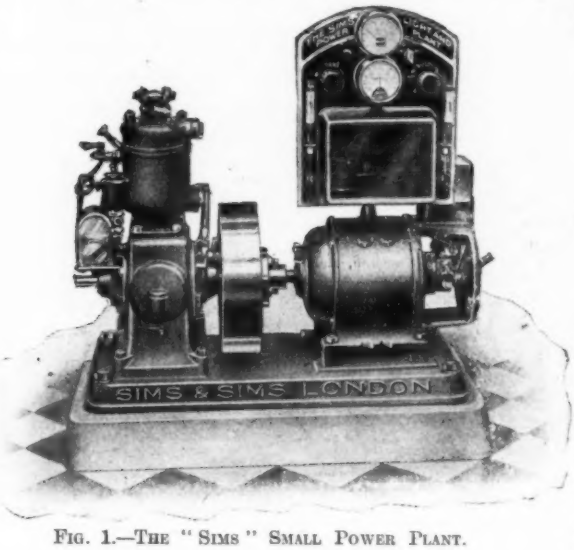


FIG. 1.—THE "SIMS" SMALL POWER PLANT.

besides those already mentioned. The sizes of the engines range from 1¼ to 12 h.p., and the dynamo output from 0.5 to 6.4 kW.

The set is semi-automatic, and the control-gear and instruments can be mounted over the dynamo, as shown in the illustration (fig. 1) or separately on a wall.

A Wall-type Oil Switch.

We illustrate in fig. 2 a wall-type h.p. oil switch, manufactured by TRAMWAY SUPPLIES, LTD., Leeds. In this switch—as in the line of which it forms a part—conductors and contacts are liberally proportioned, and the latter are easily renewed. Length and rapidity of break, head of oil, and air cushion are in accordance with up-to-date practice. The vitreous porcelain insulators used are so arranged that they are only subjected to compression, while the oil tank is of pressed and welded high-tensile steel reinforced round the arcing zone with anti-explosive bands. Refinements which will specially appeal to the user are the thumb catch on a loose handle, which prevents accidental opening of the switch when cleaning; the press button release; conspicuous "on" and "off" indicator; and the tank fixing device which enables one man to remove and replace the tank with ease and safety.

A Rapid Electric Water Heater.

Another device for the rapid heating of water by electrical means has been brought to our notice by Mr. E. BRONTMAN, 139, Bournemouth Road, Parkstone, Bournemouth. This, the "Electrawa" water heater, illustrated in fig. 3, is made in three sizes holding one, two, and three gallons respectively, the electrical loading being 1 kW in each case. The element is arranged for three-heat control, giving 400 W, 600 W, or 1,000 W as required, and extends to the full length of the apparatus, being contained in a watertight barrel supported on the base by a centre bolt. This element can easily be removed and replaced when necessary. The outlet pipe to the tap is brought up to within a short distance of the top of the tank, thus providing a safeguard against the running dry of the apparatus. A gallon of water is brought to the temperature usually required in 8 or 10 minutes. The temperature of the water can be adjusted by means of a "Cold" tap, which permits cold water to flow through the same outlet. The cylindrical tank is of nickel-plated copper, and its heat-retaining construction allows the water to remain at a high temperature for six hours after the electricity has been switched off. The largest size is fitted with a shower-bath attachment as shown below.

The makers also have a continuous hot-water flow geyser the "Ideal Electrawa" bath geyser, which is made in two sizes, loaded to 25 and 40 A respectively in four elements.

Combined Electric Oven and Water Heater.

A new type of combined electric cooker and water heater has been provisionally protected, and MESSRS. ROYCE AND HOCKING, 37, Victoria Street, Bristol, have been given sole selling and manufacturing rights by the inventor. The principle of the apparatus is to utilise the waste heat of the oven, after cooking operations are completed, to heat a large quantity of water without expenditure of electrical or any other energy for that purpose. A test made recently showed that whereas the cooking oven was very efficient, a quantity of nearly five gallons of cold water was raised to a sufficiently high temperature to be suitable for the purpose of washing up greasy dishes, and for general household use, and the inventor fully anticipates that with a slight modification of his original design, at least three gallons of cold water can be brought to boiling point. A hot-water heated cupboard is fixed to the oven for the purpose of warming plates, dishes, &c. The internal dimensions of the oven are 21 in. high, 15 in. wide, and 15 in. deep, and the loading is under 2 kW on full heat. Medium and low heat switches are provided. Provision is made for the fitting of a suitable immersion heater, by which the water can be heated independently of the oven, if necessary; this arrangement economises the energy required to heat the oven should cooking be done later, but the main principle of the invention is the availability of hot water for household purposes during, and after, cooking without the expenditure of additional energy, and this latter requirement is essential to an "all-electric home."

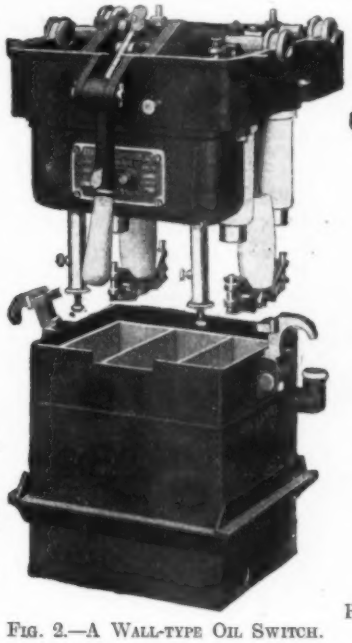


FIG. 2.—A WALL-TYPE OIL SWITCH.

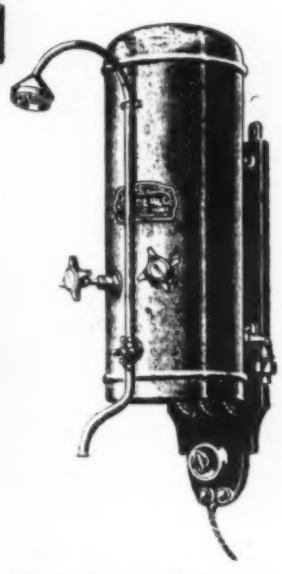


FIG. 3.—THE "ELECTRAWA" WATER HEATER.

Drainage of Mines.—The Secretary for Mines has signed a scheme, under Section 18 of the Mining Industry Act, 1920, relating to the underground drainage of mines in the Old Hill District of South Staffordshire and North-East Worcestershire. Copies of the scheme, price 3d. (by post 4d.), may be purchased through any bookseller, or direct from H.M. Stationery Office.

NEW PATENTS APPLIED FOR, 1922.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. SEFTON-JONES, O'DELL AND STEPHENS, Chartered Patent Agents, 285, High Holborn, London, W.C. 1.

15,978. "Protective mount for fixing electric meters." E. C. R. Marks (Soc. Anon. Appareillage Theco). June 8th.
15,980. "Gas-tight leading-in insulating bushes for metal vessels of mercury vapour rectifiers." Akt. Ges. Brown, Boveri et Cie. (Switzerland, June 8th, 1921.)
15,981. "Connection of aerials to wireless receivers or transmitters." C. F. Elwell, Ltd., and B. E. G. Mittell. June 8th.
16,018. "Wireless telegraphy and telephony apparatus." O. W. Walker. June 9th.
16,035. "Sparking plug." H. J. Brocklebank and V. St. A. Phillips. June 9th.
16,050. "Telephone systems employing selecting devices." D. A. Christian and Siemens Bros. & Co., Ltd. June 9th.
16,052. "X-ray grid filter for radiography, &c." W. Watson. June 9th.
16,061. "Thermionic tubes." E. Habann. June 9th. (Germany, June 24th, 1921.)
16,062. "Thermionic valves." E. Habann. June 9th. (Germany, October 14th, 1921.)
16,065. "Marine propulsion." Metropolitan-Vickers Electrical Co., Ltd. June 9th.
16,066. "Control of electric motors." E. A. Binney and Metropolitan-Vickers Electrical Co., Ltd. June 9th.
16,068. "Electrical measuring instruments." L. N. Reddie (Officine Meccaniche Italiane.) June 9th.
16,075. "Current collector bow for electric vehicles." C. Conradty (firm of). June 9th. (Germany, February 13th.)
16,081. "Electric ignition devices for internal-combustion engines." Skywing Aircraft Corporation. June 6th. (United States, December 1st, 1920.)
16,085. "Sound recording or reproducing apparatus." W. E. Clifton and Cliftophone, Ltd. June 9th.
16,088. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd. June 9th. (United States, July 22nd, 1921.)
16,104. "Sparking plugs." R. Bosch Akt. Ges. June 10th. (Germany, June 13th, 1921.)
16,112. "Method for pre-determining time of, actuating apparatus, &c., by electric currents." W. A. Andersen. June 10th.
16,117. "Rheostats for controlling filaments of vacuum tubes." A. P. Welch. June 10th.
16,157. "Electric incandescent lamps." British Thomson-Houston Co., Ltd. June 10th.
16,158. "Telephone receivers, &c." British Thomson-Houston Co., Ltd., and A. P. Young. June 10th.
16,161. "Telephone relays." C. Stille and Telegraphie Ges. System Stille. June 10th.
16,162. "Controlling gear for electric motors." English Electric Co., Ltd., and L. Rothera. June 10th.
16,181. "Railway signalling systems." Automatic Telephone Manufacturing Co., Ltd., and A. E. Tattersall. June 10th.
16,199. "Joint boxes for electric cables. W. G. Brown. June 12th.
16,202. "Electric transmission systems." A. M. Taylor. June 12th.
16,226. "Detachable filament for wireless valves, &c." E. W. Powell. June 12th.
16,243. "Reception of undamped oscillations." R. A. Jouaust. June 12th. (France, June 22nd, 1921.)
16,249. "Telephone exchange systems." G. C. Snijders. June 12th. (Holland, June 14th, 1921.)
16,268. "Electric ignition devices for internal-combustion engines." Skywing Aircraft Corporation. June 12th. (United States, December 1st, 1920.)
16,276. "Control mechanism for electric motors, &c." British Thomson-Houston Co., Ltd., and R. D. Given. June 12th.
16,277. "Control of dynamo-electric machines." British Thomson-Houston Co., Ltd., R. D. Given, and H. W. C. Liddiard. June 12th.
16,284. "Mechanical transmitter for wireless telegraphy." W. F. M. Rose. June 12th.
16,286. "Frequency changers." Ges für Drahtlose Telegraphie. June 12th. (Germany, August 2nd, 1921.)
16,301. "Galvanic cells." H. D. Nyberg. June 12th. Sweden, March 28th.)
16,302. "Lighting plants of motor vehicles." Scintilla. June 12th. (Switzerland, June 13th, 1921.)
16,303. "Windings of electro magnets." Scintilla. June 12th. (Switzerland, July 9th, 1921.)
16,305. "Radio communication, &c." W. H. Wilson. June 12th.
16,312. "Ringing device for toy telephones, &c." Gong Bell Manufacturing Co. June 12th. (United States, June 11th, 1921.)
16,351. "Electric furnace." A. Jones. June 13th.
16,362. "Electric conductors." W. B. Sayers. June 13th.
16,370. "Method of compensating voltage produced by self-induction and capacity in dynamo-electric machines." M. Piohl. June 13th.
16,376. "Printing telegraph receiver." Morkrum Co. June 13th. (United States, June 13th, 1921.)
16,381. "Electric butt-welding machines." A. E. White (Elyria Iron and Steel Co.). June 13th.
16,382. "Electric brush structures." A. E. White (Elyria Iron and Steel Co.). June 13th.
16,398. "Electric heaters." L. Frost and W. Stubbs. June 13th. (Australia, July 13th, 1921.)
16,420. "Quick make-and-break switches." J. B. Tucker. June 14th.
16,428. "Apparatus for supply of energy for wireless telephone and telegraph apparatus." L. C. Grant. June 14th.
16,434. "Hornless cabinets for wireless recorders." A. E. Roberts and L. H. Thompson. June 14th.
16,442. "Rendering line capacity of telephone cables uniform." British Insulated & Helsby Cables, Ltd., and F. Mercer. June 14th.
16,443. "Elimination of overhearing or cross-talk in telephone circuits." British Insulated & Helsby Cables, Ltd., F. Mercer and W. Holttum. June 14th.
16,447. "Electrical device for giving set speeds to gramophones." W. Gee. June 14th.
16,448. "Revolving disk for electric motor and foot switch for dental, &c., purposes." W. Gee. June 14th.
16,450. "Electric switches." A. S. Cubitt. June 14th.
16,455. "Automatic electric signalling system." E. Curtis. June 14th.
16,472. "Signalling in wireless telegraphy." E. J. Grainger, L. G. Preston, and G. Shearing. June 14th.
16,477. "Electric wave filters." Western Electric Co., Ltd. (Western Electric Co., Inc.). June 14th.
16,478. "Automatic telephone switches." Western Electric Co., Ltd. (United States, July 21st, 1921.) June 14th.
16,491. "Telephone systems." Siemens and Halske Akt. Ges. June 14th. (Germany, July 15th, 1921.)
16,492. "Plug-and-socket coupling for electric connections." H. Barkes. June 14th.
16,498. "Automatic electric switches." H. Lucas and O. Lucas. June 14th.
16,499. "Brush-holders for dynamo-electric machines." H. Lucas and O. Lucas. June 14th.
16,518. "Polyphase transformers." Pittsburgh Transformer Co. June 14th.
16,530. "Method of transmitting pictures by telegraphy." R. S. Clay. June 14th.
16,537. "Electric couplings." W. J. Polyblank. June 15th.
16,557. "Electric lighting devices." H. North. June 15th.
16,562. "Ignition apparatus for internal-combustion engines." C. T. Hill. June 15th.
16,565. "Welded joints for tramways, &c." H. Bolton and O. Wallace. June 15th.
16,575. "Wireless telegraphy." Sir O. J. Lodge and E. E. Robinson. June 15th.
16,576. "High-frequency selective wireless receiving apparatus." M. Compare, G. A. O'Hanlon, and A. Orling. June 15th.
16,577. "Low-frequency selective wireless receiving apparatus." M. Compare, G. A. O'Hanlon, and A. Orling. June 15th.
16,578. "Secret wireless intercommunication." M. Compare, G. A. O'Hanlon, and A. Orling. June 15th.
16,591. "Electric signalling." F. E. Pernot. June 15th.

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1920.

33,477. "Dynamo-electric machines." C. J. Coleman. November 26th, 1920. (180,706.)
33,839. "Burglar and like alarm systems." S. G. Adams. November 30th, 1920. (180,708.)

1921.

1,307. "Telegraphic or telephonic communication by single line without earth return." L. Duverger. January 21st, 1919. (Addition to 157,385.) (157,387.)
1,308. "Telegraphic or telephonic communication." L. Duverger. May 8th, 1919. (Patent of addition not granted.) (157,388.)
1,891. "Means for preventing the sagging of heating elements of electric fires." J. Y. Fletcher and R. G. H. Hill. October 5th, 1921. (180,714.)
2,601. "Means or apparatus for use in recording or registering call connections effected through a telephone instrument." C. Seal. March 31st, 1921. (180,715.)
3,246. "Electro-magnetic switch devices." Metropolitan-Vickers Electrical Co., Ltd. February 26th, 1920. (159,176.)
3,578. "Means for making and breaking electrical circuits." A. E. Davies and F. M. Brown. January 29th, 1921. (180,724.)
6,517. "Electrical liquid heaters." Festa Akt. Ges. September 3rd, 1920. (Patent of addition not granted.) (168,577.)
6,575. "Cooling terminal for sparking plugs." A. Ford. February 28th, 1921. (180,742.)
6,596. "Production of high-tension discharges and high-frequency oscillations." W. H. Wilson. February 28th, 1921. (180,745.)
6,655. "Electric storage batteries." Chloride Electrical Storage Co., Ltd. (B. Ford). February 28th, 1921. (180,747.)
6,770. "Direct-current electric motors." R. J. Butler and Metropolitan-Vickers Electrical Co., Ltd. March 1st, 1921. (180,754.)
6,928. "Means or apparatus for electrically controlling the ignition of internal-combustion engines." J. R. Charnock. March 3rd, 1921. (180,760.)
7,109. "High-resistance conductors for electrical machinery." British Thomson-Houston Co., Ltd., and H. W. Taylor. March 4th, 1921. (180,765.)
7,307. "Magneto-electric machines." E. C. R. Marks (C. F. Dufaux). March 7th, 1921. (180,771.)
7,692. "Electric signalling along conductors." B. Davies and Eastern Telegraph Co., Ltd. March 10th, 1921. (180,779.)
7,743. "Method to fasten electric cables and wires to porcelain and other insulators." W. R. Millar. March 11th, 1921. (180,780.)
7,987. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd. March 29th, 1920. (161,168.)
8,103. "Magneto-electric machines." British Thomson-Houston Co., Ltd., A. P. Young, and H. W. H. Warren. March 15th, 1921. (180,788.)
8,550. "Means or apparatus for reducing the starting load on hydraulic pumps and similar machines directly coupled to electric motors." F. Simpkin and G. W. Whitelock. March 19th, 1921. (180,799.)
8,661. "Earthing clip for electric conductors." Walsall Hardware Manufacturing Co., Ltd., A. E. Read, J. E. Franks, and C. G. Maisey. March 21st, 1921. (180,802.)
9,508. "Apparatus for the examining X-rays and other ionising rays." Veifa-Werke Vereinigte Elektrotechnische Institute, Frankfurt, Aschaffenburg, and Dr. G. Hubers. March 30th, 1921. (180,819.)
9,532. "Control systems for electric furnaces." O. G. Sharples. March 31st, 1921. (180,821.)
9,814. "Enclosed electric fuses." H. A. Erdbrink, F. C. Mellmann, and F. W. Randt. April 2nd, 1921. (180,824.)
9,904. "Adjustable telephone bracket." T. W. Arney. April 4th, 1921. (180,826.)
10,199. "Device for testing the sparking plugs of internal combustion engines and the like." G. Burchell. April 6th, 1921. (180,835.)
10,892. "Control of electric lifting magnets, magnetic chucks, dynamo and motor field magnet circuits and the like." E. Holme & Co., Ltd., W. Brooke, and Steel, Peech & Tozer, Ltd., and H. E. Bowen. April 14th, 1921. (180,845.)
10,939. "Dynamo electric machines." S. L. Price. April 14th, 1921. (180,847.)
11,035. "Machine for slotting the insulation between commutator bars of electric machines." J. Philips. April 15th, 1921. (180,848.)
11,392. "Anti-vibration devices used in conjunction with incandescent electric lamps or the like." J. R. Thompson. April 20th, 1921. (180,854.)
11,412. "Recording reception and reproduction of sounds." O. Bothe. April 20th, 1920. (161,979.)
12,023. "Combined ignition and lighting magneto generators." Villiers Engineering Co., Ltd., and J. Bradley. April 26th, 1921. (180,865.)
12,258. "Casings for electrical apparatus, such as transformers and the like." British Thomson-Houston Co., Ltd. (General Electric Co.). April 28th, 1921. (180,870.)
12,703. "Secondary batteries." J. F. Holmes and Hart Accumulator Co., Ltd. May 3rd, 1921. (180,878.)
13,270. "Apparatus for cancelling electrical signals." M. J. Railing and J. J. V. Connaughton. May 10th, 1921. (180,882.)
15,128. "Electric arc-welding machines." British Thomson-Houston Co., Ltd. (General Electric Co.). May 31st, 1921. (180,900.)
15,164. "Electrical ignition systems." H. L. Curzons. June 1st, 1921. (180,901.)
17,128. "Evacuation of electric lamp bulbs or the like." Patent Treuhand Ges. für Elektrische Gluhlampen. June 22nd, 1920. (165,406.))
18,097. "Transmission dynamo meters." F. Krupp Akt. Ges. November 10th, 1920. (Addition to 147,137.) (171,359.)
18,227. "Electrical transformers, reactance coils, and similar devices." Metropolitan-Vickers Electrical Co., Ltd. July 30th, 1920. (167,158.)
21,338. "Metallic articles having an electrically-insulating and mechanically-adhesive coating." F. Krupp Akt. Ges. September 3rd, 1920. (168,592.)
23,962. "Arrangement for damping the third-higher harmonic wave in three-phase transformers or choking coils." Akt. Ges. Brown, Boveri et Cie. September 15th, 1920. (169,161.)
28,194. "Electric furnaces." Norske Aktieselskab for Elektrokemisk Industri-Hypotekbank. November 1st, 1920. (170,848.)
28,241. "Apparatus for precipitating dust from gases by electricity." Siemens-Schuckertwerke Ges. October 22nd, 1920. (170,601.)
31,622. "Process for producing an electrically-insulating and mechanically-adherent coating on metal articles." F. Krupp Akt. Ges. December 30th, 1920. (Addition to 168,592.) (172,620.)

1922.

2,088. "Overload circuit breakers." F. Krupp Akt. Ges. February 19th, 1921. (175,964.)

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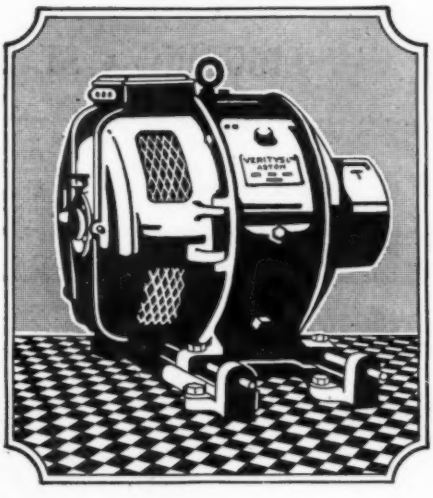

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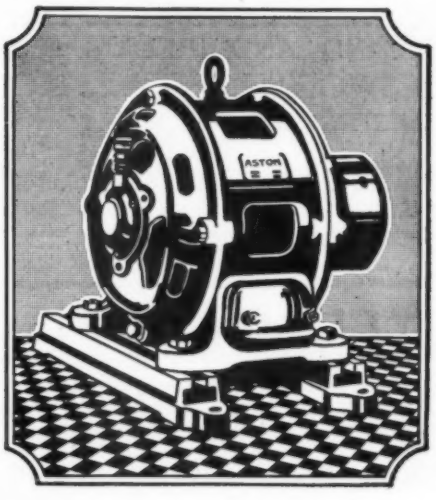

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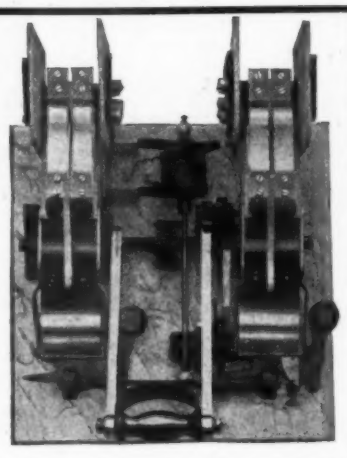

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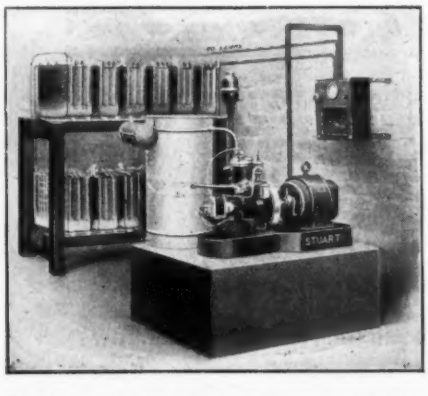

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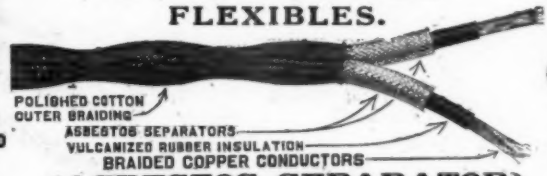

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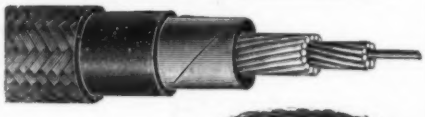

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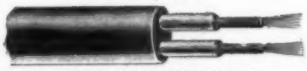

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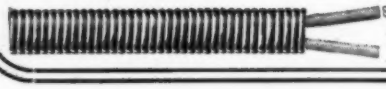

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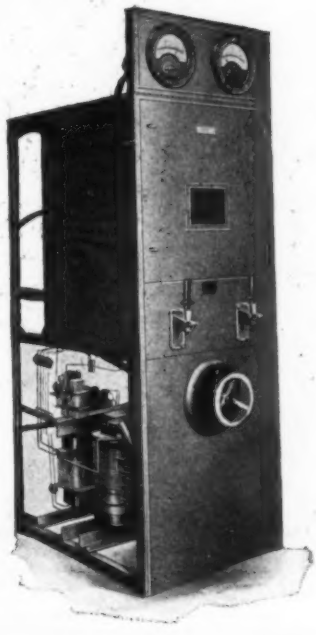

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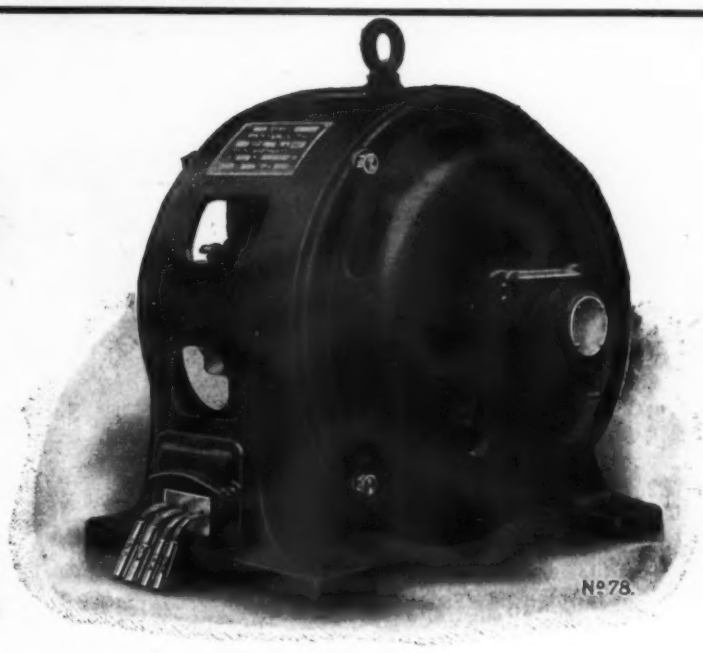

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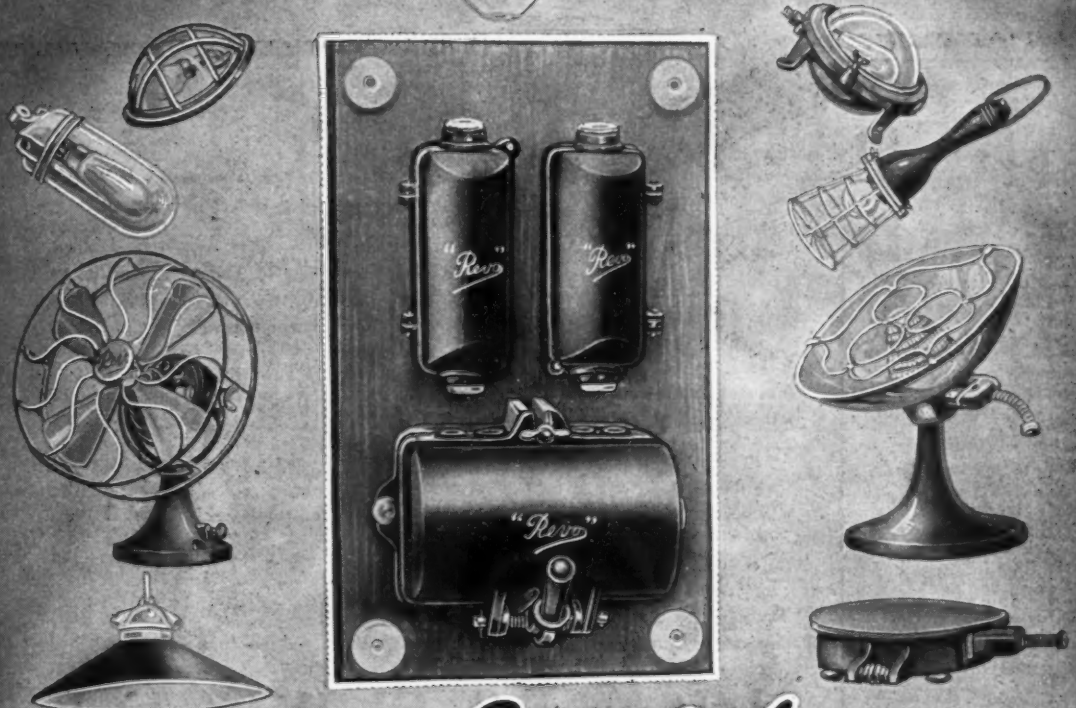

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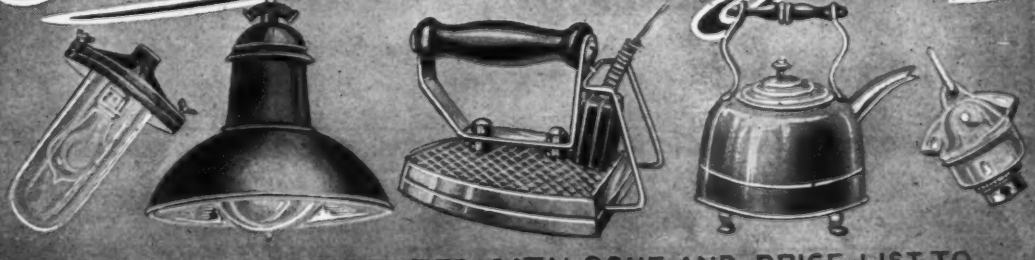

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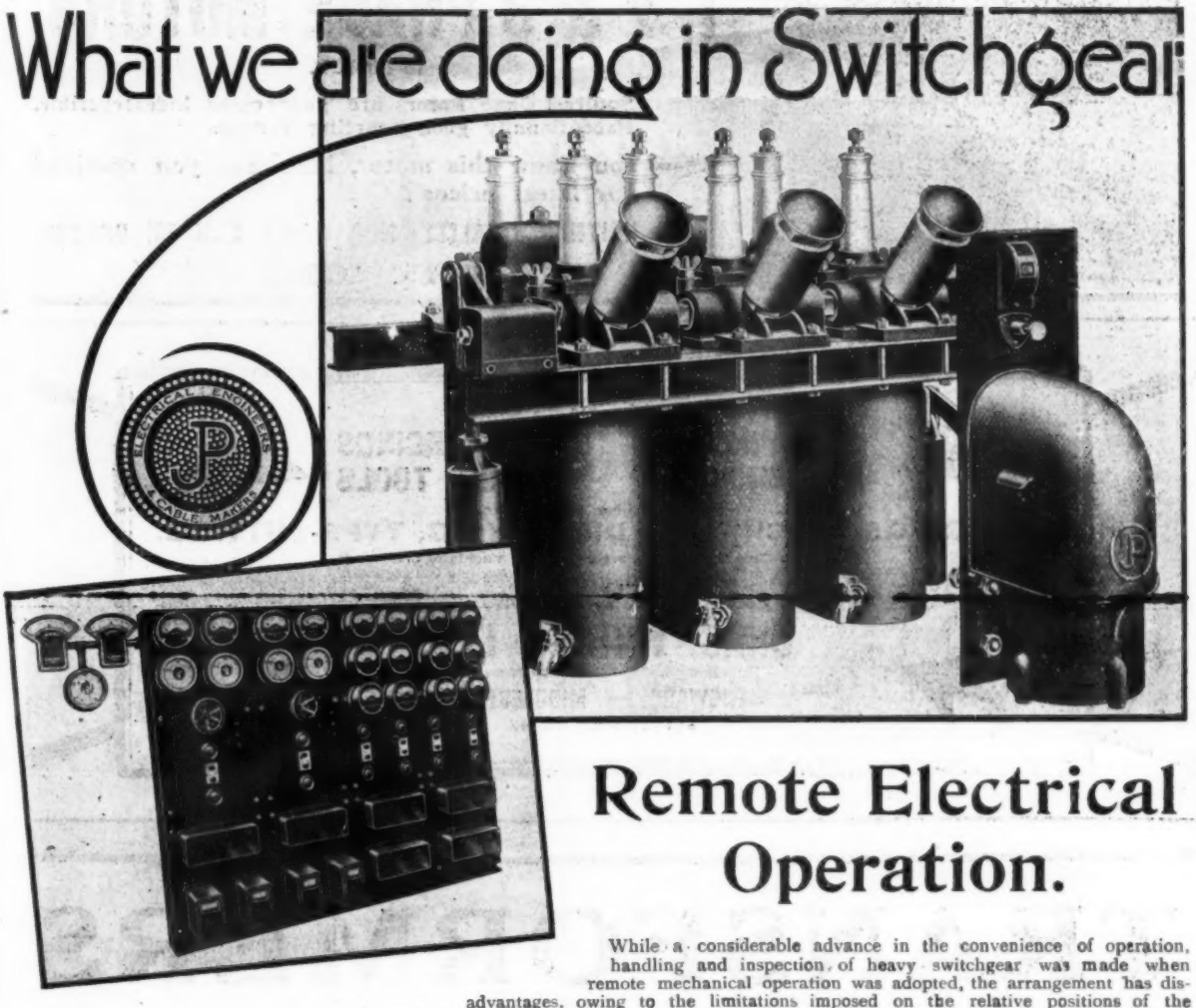

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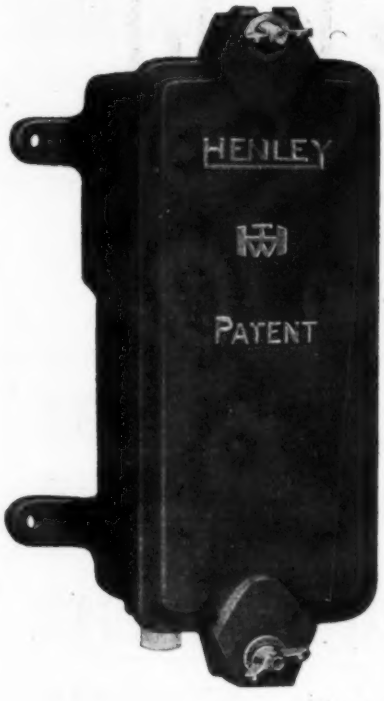

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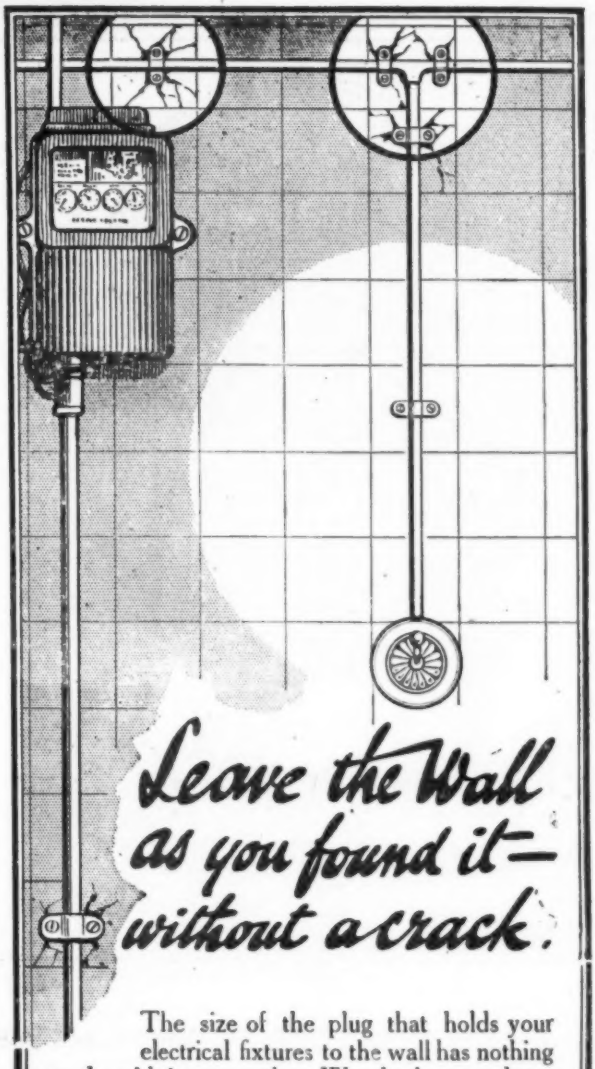

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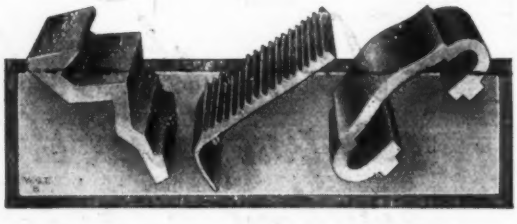

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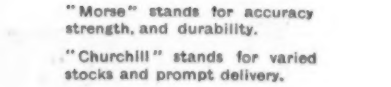

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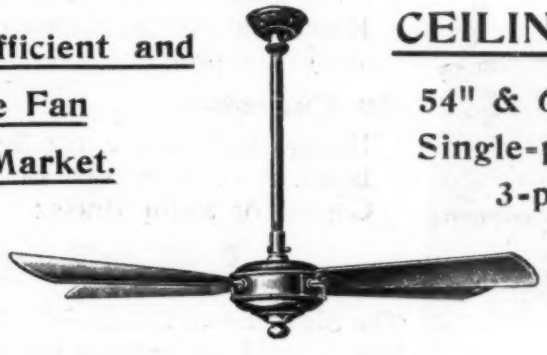

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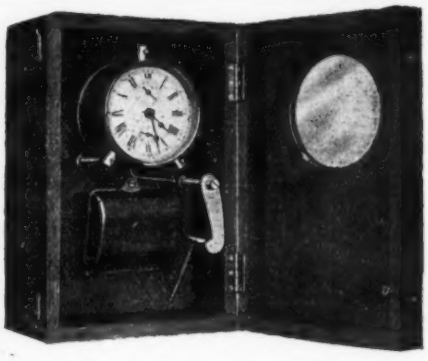

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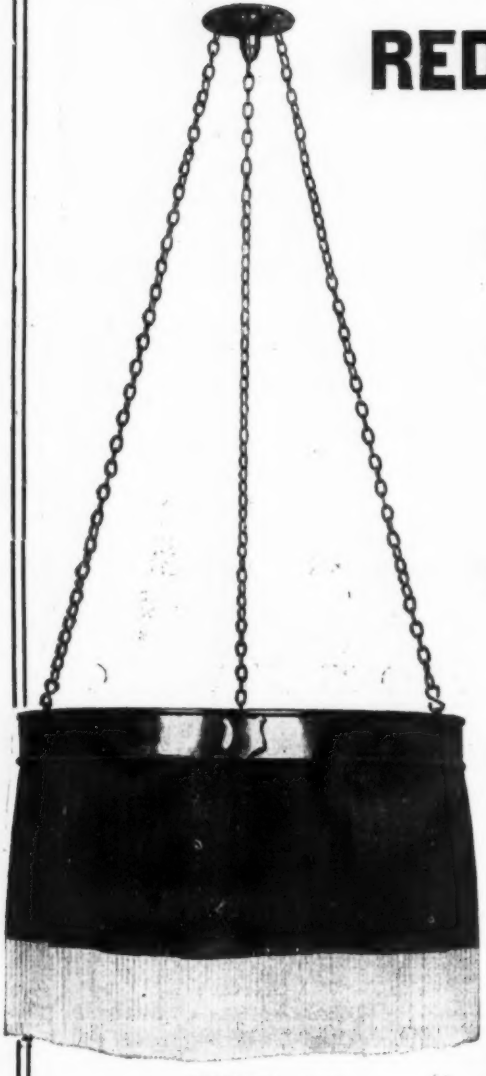

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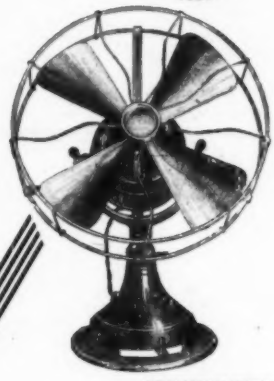

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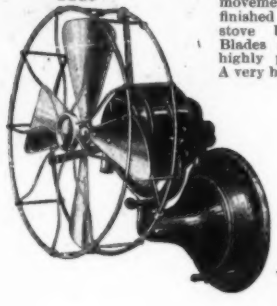

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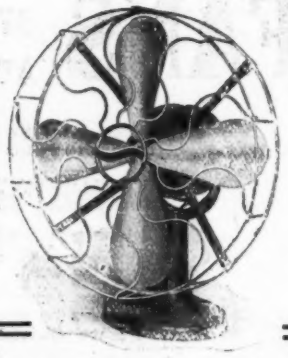

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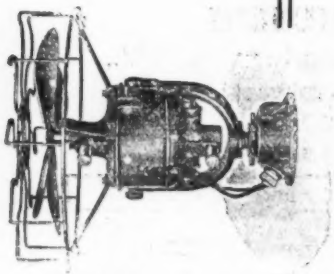

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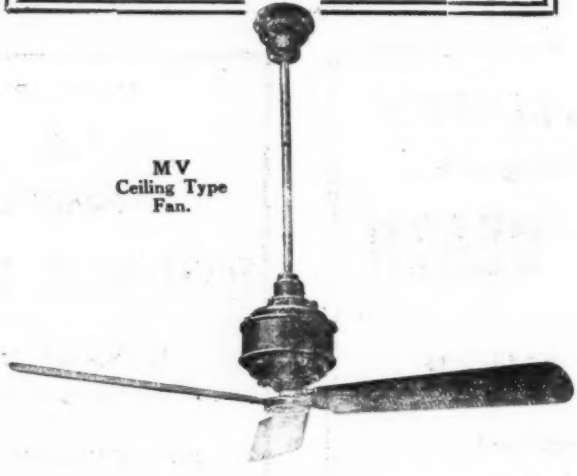

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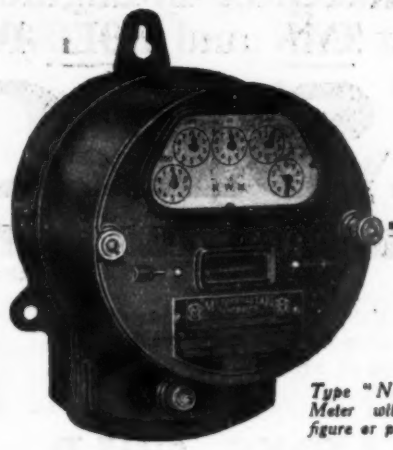

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Dorman's Patented Flexible Joints used with Hose is a Guarantee against Hose breakages at acute working angles. FLEXSTEL Joints reduce Hose renewals and maintenance costs.

DORMAN'S

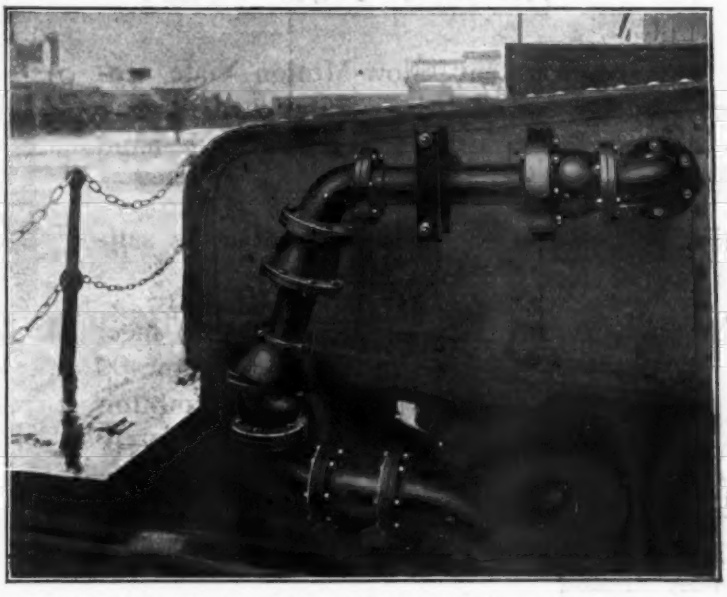
FLEXSTEL

DORMAN'S PATENTED EXPANSIBLE AND FLEXIBLE JOINTS in Steel and other Metals from ½ inch to 12 inch bore. Guaranteed to withstand successfully the highest fluctuating and intermittent pressures for WATER, GAS, OIL, AIR, PETROL, ACIDS, SATURATED or SUPERHEATED STEAM and for many Trades and purposes. Joints are Standardized and Interchangeable. A line can be quickly and easily lengthened or shortened by unskilled labour.

A Striking Severe and Unique Practical Application.

Applicable to all Trades.

Adds Life to Hose.



Flexstel Joints continue Absolutely Water Tight after withstanding for many months the strains of the open River Tides.

FLEXSTEL Patented Flexible Joints applied to 5 in. Corporation Water Main on FLOATING Landing Stage, Liverpool. Allowing for a 33 ft. rise and fall of Tides.

NATIONAL PHYSICAL LABORATORY REPORT:

"Extensive and severe tests have been taken to prove the durability of Flexstel Patented Joints. A ½ inch bore Pipe-line was submitted to the National Physical Laboratory for destructive test. It ultimately gave out under a pressure of 9.2 tons per square inch, when the Pipe-line Metal actually fractured. The joint being perfectly fluid proof till fracture occurred.

Dorman Flexstel Joints interposed with Plain Piping.

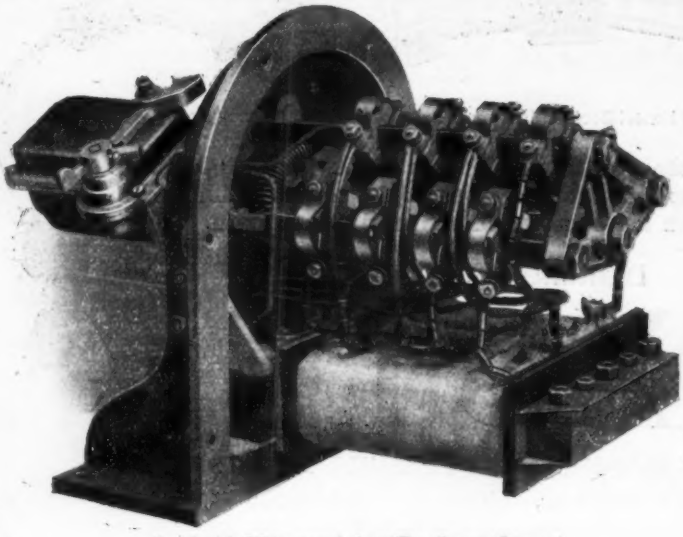
Flexstel Patented Joints have been tested for Petrol under pressure for prolonged periods. Flexstel Joints OSCILLATED MILLIONS OF TIMES and at the end of the period the Flexstel Joints proved absolutely petrol tight and showed no appreciable signs of wear. Flexstel Patented Joints constructed as pipe-line of absolutely any length withstand any amount of rough usage, climatic conditions, high and intermittent pressures, and can be relied upon for conveying water, saturated or superheated steam, oil, compressed air or gases, under any working pressures. The pitch of the Flexstel Joints regulates the flexibility and cost of the pipe-line. A pipe-line can be constructed of varying pitches, throughout its length to meet special and actual conditions.

W. H. DORMAN & CO., LTD., STAFFORD. Specialists in the Designing and Building of Petrol and Paraffin Internal Combustion Motor and Stationary Engines: "The Heart of a Car is the Engine." Makers of Wave Transmission, Mining and other Plants. Patent Owners and Makers of the Hele-Shaw Hydraulic (Oil) Clutch.

Head Office and Works: STAFFORD.
Telephone No. 121 (2 lines). Telegrams: "Dorman, Stafford."

London Office: St. Bride's House, Salisbury Square, E.C.4
Telephone No. 8157 Central. Telegrams: Typify, Fleet, London."

"Flexstel" is a Registered Trade Mark and Patented in the Principal Countries of the World.



Interior of Oil-immersed Auto-Transformer Starter.

DRUM-TYPE IRONCLAD A.C. CONTROL GEAR

For all purposes.

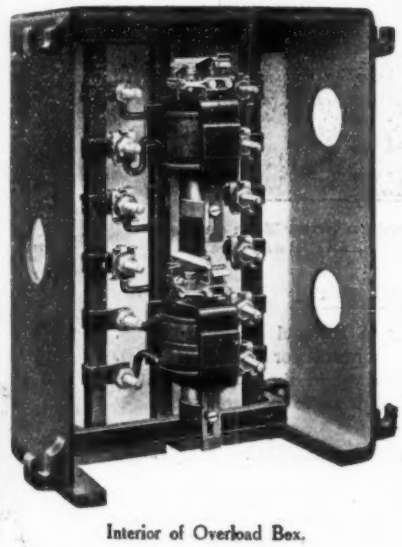
These Illustrations show Typical Examples of AIR-BREAK and OIL-IMMERSED TYPES.

All Starters have our Patent Slow-Motion Gate, ensuring correct sequence and positive stop at each starting position by moving the Starter Lever with one hand in one direction only.

Mica insulation alone is used. Every Contact is self-aligning and can be replaced in a minute.

A complete range, carefully stepped, enables us to meet any requirement up to 400 H.P. and, by assembling from stock parts, to **deliver within a few days.**

Air Break Auto-Transformer Starter, with No-volt and Overload Releases.



Interior of Overload Box.

A glance at the Overload and Terminal Box will show how conveniently all Terminals are placed for rapid wiring.

The ELECTRICAL APPARATUS CO., LTD.,

INCORPORATING

BRAY, MARKHAM & REISS, LTD.,

HEAD OFFICE:

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Telephone:—BRIXTON 2075 (6 lines). *Telegrams:* "ELAPRATUS, VAUX, LONDON."

Works: Vauxhall, Wandsworth, St. Albans.

SALES OFFICES:

MANCHESTER—Palatine Buildings, Victoria Street.
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DUBLIN—3, Dame Street.
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Ballsok Beads

(PROVISIONALLY PROTECTED.)

Approved by THE ADMIRALTY.

The FINAL SOLUTION of the PROBLEM of BARE WIRE INSULATION.

For Cooking and Heating Apparatus, Furnaces, Arc Lamp Resistances, Cinema and Theatre Regulators, Starters, Controllers, Thermo-Couples, &c.

High temperature refractory material up to 1200° C. Sizes to take 17, 15, 13, 11 S.W.G. Beautifully made. English product. Will not expose the wire.

Wrong threading corrected by breaking one bead. No accidental reversal possible which necessitates complete unthreading. Keen prices.

Keenly competitive prices also for **ORDINARY BLACK GLASS INSULATING BEADS.**

Write for samples and prices to

LIONEL ROBINSON & CO.,

(Partners: Lionel Robinson and W. E. Warrilow),

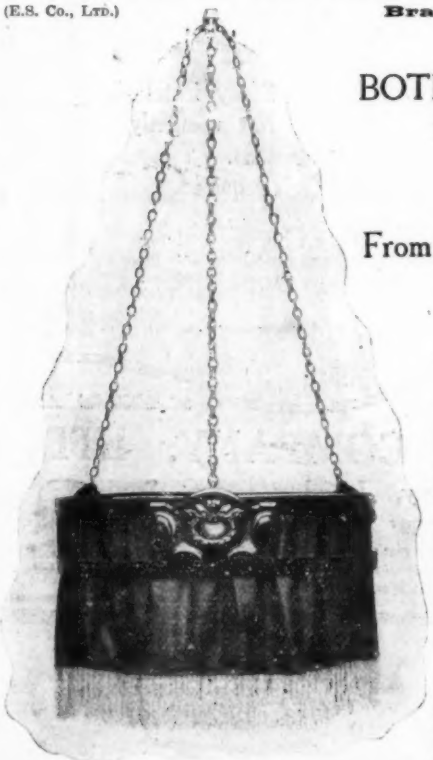
3, Staple Inn, London, W.C. 1.

Telegrams: Ferrydom, Holb., London. Telephone: Holborn 6323.

THE ELECTRICAL SUPPLIES CO., (E.S. Co., Ltd.)

233, TOTTENHAM COURT RD., LONDON, W. 1.

Branches:—MANCHESTER and MIDDLESBROUGH.



BOTH MODELS MADE IN
12", 14" and 16".

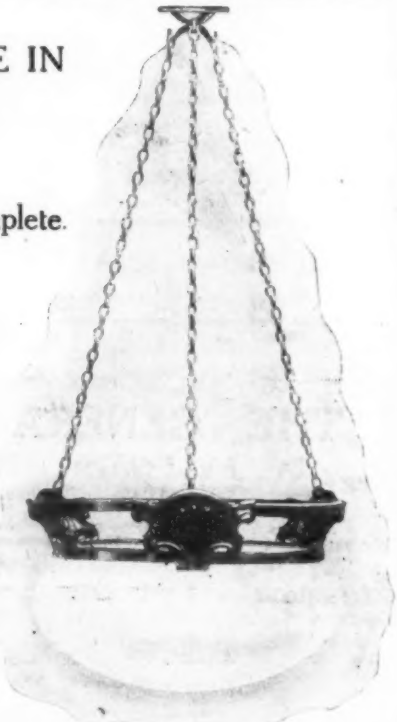
From **25/-** Complete.

Send for special leaflet giving full particulars.

Competitive Lines.

FITTINGS and SILK SHADE SHOWROOMS and TRADE COUNTER FOR GENERAL ACCESSORIES, LAMPS, CROWN CABLES, &c.,

OPEN 8 30 a.m. to 6 p.m.



R 669.—Fitted with any colour silk flounce and 2 in. silver bead fringe, lined white silk.

R 3669.—Fitted with English illuminating opal glass.

"KINGSWAY" Wiring System

(Patent applied for. Prov. spec. 33626/20.)

Conforms to I.E.E. Rules.

The most efficient and most economical system on the market.

This system entirely meets the varied and oft conflicting requirements of surface wiring installations.

Simple design. **Easily installed.**
Safe operation. **Not unsightly.**
Moderate Cost.
No special tools required.

The number of special accessories has been reduced to a minimum, enabling contractors to cater for a large amount of business without carrying heavy and varied stocks.

Write for full particulars.

THE GENERAL ELECTRIC COMPANY, LTD.

***Head Office*: Magnet House, Kingsway, London, W.C. 2.**

Telephone: Regent 7050 (50 lines). *Telegrams:* "Electricity, Westcent London."

Branches: Manchester, Leeds, Liverpool, Sheffield, Glasgow, Aberdeen, Newcastle, Hull, Birmingham, Nottingham, Cardiff, Bristol, Swansea, Dublin, Belfast, Cork, Southampton, Ipswich, Edinburgh, Dundee.

And in all the Principal Markets of the World.

DISPLAYED ADVERTISEMENTS

ADVERTISERS will please note that NEW COPY and ALTERATIONS to Existing Advertisements (with Blocks) should reach here not later than

FRIDAY MORNING.

OFFICIAL NOTICES, PATENT NOTICES, SITUATIONS VACANT, SITUATIONS WANTED, PARTNERSHIPS, AGENCIES, ARTICLES FOR SALE, ARTICLES WANTED, ETC.

Latest Time 5 p.m. WEDNESDAY.

The ELECTRICAL REVIEW is the recognised Medium of the Electrical Trades, and has BY FAR THE LARGEST CIRCULATION of any Electrical Industrial Paper in Great Britain.

AUCTIONEERS

and VALUERS of

Electrical Works, Plant and Stock.

WHEATLEY KIRK, PRICE & CO.

(Established 1850).

46, Watling Street, London, E.C. 4. — 16, Albert Square, Manchester.

26, Collingwood Street, Newcastle-on-Tyne.

AUCTION.

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BY DIRECTION OF THE DISPOSAL BOARD.

SALE BY PUBLIC AUCTION IN LOTS OF

BOILER HOUSE PLANT,
WOODWORKING MACHINERY,
ELECTRICAL PLANT,
MOTOR VEHICLES, MACHINE TOOLS,
STOCK and STORES,

At H.M. FACTORY, GRETNA, DUMFRIESSHIRE,

On TUESDAY, WEDNESDAY, THURSDAY and FRIDAY,
July 18th, 19th, 20th and 21st,

commencing at 11 o'clock prompt each day, including :—

28 Lancashire Boilers, 30 ft. long by 8 ft. dia., by Galloways, Ltd., Yates & Thom, and other makers.
One Cochran Vertical Boiler, 6 ft. 6 in. dia. by 14 ft. high.
Eight Superheaters, by T. Sugden, Ltd.
Six "Green's" Fuel Economisers.
24 pairs Mechanical Stokers, by J. Hodgkinson, Ltd.
28 Bucket Coal Elevators, by Bennis & Co., Ltd., and Fraser and Chalmers.
Nine sets Worm Reduction Gears, by Henry Wallwork & Co., Ltd.
Two 120-kW Steam Generating Sets.
70 Slip-ring and Squirrel-cage Motors, all 50 periods, sizes ranging from 1 h.p. to 250 h.p.
Horizontal Steam Engine, 10 in. cylinder by 16 in. stroke.
40 b.h.p. Vertical Steam Engine, by Robey & Co., Ltd.
Five Direct-acting Boiler-feed Pumps, by G. & J. Weir, Ltd.
Steam Capstan, 6 in. dia. cylinders by 6½ in. stroke, by Thos. Reid & Sons.
Eight 3-phase Transformers, sizes ranging from 2½ kVA to 25 kVA.
7-ton Steam Locomotive Crane.
Two 18-in. Belt Conveyors, by Fraser & Chalmers.
Three 55-in. Induced-draught Fans, by Davidson & Co.
Two 20-in. "Sirocco" Fans.
One Tenoning Machine, by McDowall & Sons.
Two 26 in. dia. Pendulum Saws.
Frame Saw, to take 21 by 21 in. logs, by McDowall & Sons.
Rack Saw Bench, 60 ft. long by 31 in. wide, by Robinson and Sons, Ltd., Rochdale.
Two Circular Saw Benches.
Three Band Saw Machines.
Three Chain Morticing Machines.
Planing and Thicknessing Machine.
4 ft. Radial Drilling Machine, by Smith & Coventry.
Seven Pillar Drilling Machine.

(*Continued on next column.*)

AUCTION.—*Continued.*

Four Pipe Screwing Machines.
Six Screwcutting Lathes, sizes from 3½ in. to 10½ in. centres.
Two Shaping Machines.
3-ton Overhead Runway Crane, by Tangyes, Ltd.
10 cwt. Overhead Travelling Crane, by Herbert Morris, Ltd.
12-ton Platform Weighing Machine, by Henry Pooley and Sons.
Two Double Purchase Winches, by Fellows Bros.
10 cwt. Platform Weighing Machine, by W. & T. Avery, Ltd.
One 10-12 ton Standard Truck Tippler, by Fraser & Chalmers.
Two Stacker and Loaders with telescopic ends.
250 h.p. Motor-driven Centrifugal Pump, by Mather and Platt.
10 Duplex Pumps, 6 in. by 5 in. by 6 in.
50 Small Centrifugal Pumps.
Concrete Mixer.
Two Fireless Locomotives.
14 Motor Cars, Lorries and Vans.
One Enfield 3 h.p. Motor Cycle.
Quantity of Steel Piping, from 6 in. to 16 in. dia.
Hopkinson's Valves, from 1 in. to 16 in. dia.
Steel Shafting.
Quantity of Electric Cable, Stores, Instruments, &c., &c.
17 Railway Carriages.
Numerous Spare Parts for Motor Vehicles.
Oil Gas Generating Plant, 500 cu. ft. capacity.
40 tons Railway Weighbridge.
Five Signal Cabins.

On view one week prior to Sale, and each morning of Sale before selling commences.

For catalogues and any further information, apply to the Disposals Board Officer, at the Factory, or the Auctioneers, Messrs.

WHEATLEY KIRK, PRICE & CO.,

26, Collingwood Street, Newcastle-upon-Tyne; 46, Watling Street, London, E.C.4; and 16, Albert Square, Manchester.

Registered Telegraphic Addresses: "Indicator," Newcastle-upon-Tyne; "Indices," Cent., London; "Indicator," Manchester.

Telephones: 3229 Central (Newcastle-upon-Tyne); 5077 Bank (London); 3218 Central (Manchester). 906

SITUATIONS VACANT.

Latest Time for receiving, 5 p.m. Wednesday.

If letters are not to be delivered to certain firms or individuals (if known), instructions to that effect should be sent to the Manager of the ELECTRICAL REVIEW, who will do his best to carry out such instructions. Letters of applicants cannot in such cases be returned to them, nor can the names of Advertisers using a number in any way be disclosed.

Original Testimonials should never be sent.

BOROUGH OF STOKE NEWINGTON.

APPLICATIONS are invited for the position of Sub-Station Attendant. Previous experience with e.h.t. converting plant essential. Present wages £4 7s. 3d. per week, varying according to the cost of living.—Applications, stating age, and giving particulars of training, experience, enclosing copies of testimonials, and when duties can be commenced, should be addressed to C. S. Hann, Borough Electrical Engineer, Edwards Lane, Stoke Newington, N.16, to be received not later than July 10th, 1922. 910

SITUATIONS VACANT.—*Continued.*

GORSEINON ELECTRIC LIGHT CO., LTD.

Appointment of Resident Engineer.

APPLICATIONS are invited for the position of Resident Engineer to the company. The person appointed will be required to take charge of the company's electricity undertaking, under which bulk supplies are obtained from another authority. Applicants must have received a sound technical education and have had experience of three-phase alternating-current systems as well as continuous current. Commencing salary, £300 per annum. The successful candidate will be required to devote the whole of his time to the duties of the office and to reside within the district. Applications in writing only, giving full particulars as to training and experience, with copies of not more than three recent testimonials, to be addressed to the undersigned on or before July 5th, 1922.

DAVID JONES,
Secretary.

Gorseinon Electric Light Co., Ltd, Gorseinon, Glam. 808

Assistant Divisional Engineers in the Telegraph Department of the Government of India.

THE Secretary of State for India in Council will, in 1922, select five candidates for appointment to this service in 1923, after undergoing a year's preliminary training in this country.

Every candidate must be a British subject, or a ruler or subject of any State in India in respect of whom the Governor-General of India in Council has made a declaration that he is to be considered eligible.

The appointments for Europeans will, as far as possible, be reserved for candidates who served in His Majesty's Forces during the war, or who were prevented on adequate grounds from so serving. Candidates who were not of military age at the date of the armistice will be regarded as coming within the latter category.

Candidates must be not more than 24 years of age on the 1st October, 1922, but preference will be given to candidates who are not more than 23 years of age on that date.

Every candidate must have (1) obtained a degree, diploma, or other equivalent distinction in electrical engineering from any University or Institution of University standing in the United Kingdom, and (2) spent at least one year on practical electrical engineering work.

Applications from candidates must reach the India Office not later than July 15th. Printed forms, together with information regarding the conditions of appointment, may now be obtained from the Secretary, Public Works Department, India Office, Whitehall, London, S.W.1.

India Office, London. 639

THE URBAN DISTRICT COUNCIL OF ABERDARE.

Appointment of Chief Clerk in the Electricity and Tramways Department.

APPLICATIONS are invited for the post of Chief Clerk in the Electricity and Tramways Department of the above Council.

Candidates must have had experience in the office of a central electricity supply station, and preference will be given to those who, in addition, have tramway office experience.

The salary, payable monthly, will be at the rate of £133 13s. per annum, together with a bonus at present amounting to £116 7s. per annum—the latter being subject to variation under Civil Service Award No. 102, the present total of salary and bonus being £250 per annum.

Applications, stating age, full particulars of experience, qualifications, &c., must be accompanied by copies of three recent testimonials, and forwarded to the undersigned, endorsed "Chief Clerk," so as to reach him not later than July 12th, 1922.

CLERK TO THE COUNCIL.

Town Hall, Aberdare.
June 26th, 1922. 919

NENAGH.

THE Nenagh Gas & Electricity Supply Co., Ltd., are prepared to receive applications from competent men to take charge of their electricity supply system, including suction gas engines and producers, dynamos, motor booster set, switchboard, battery, overhead distribution system, meters, consumers' services, installations, &c.—Applications, stating full particulars of previous experience, together with copies of testimonials, and salary expected, to be addressed to the secretary, and to reach the office not later than Wednesday, July 5th, 1922.

M. CAHILL,
Secretary.
920

SITUATIONS VACANT.—*Continued.*

LEEDS TECHNICAL SCHOOL,

Cookridge Street, Leeds.

CHIEF Lecturer in electrical engineering required for day and evening courses at the above-named school. Candidates should possess University Degree or equivalent, and industrial experience.

Initial salary £300 to £350, according to qualifications and experience.

Statement of duties may be obtained from the Principal.

Forms of application, which should be returned as soon as possible, may be had from the undersigned.

JAMES GRAHAM,
Director of Education.

Education Offices, Leeds. 887

BELFAST CORPORATION.

Electricity Department.

APPLICATIONS are invited for the position of Generating Engineer. Candidates must have had experience in a large power station, and be conversant with e.h.t. three-phase generation from coal to switchboard. He will be responsible to works superintendent for the efficient operation of the plant, and will have control of station operation staff.

Salary in accordance with N.J.B. Schedule, Class F, Grade 5.

Applications, stating age, giving full particulars of training, experience, qualifications, and the earliest date on which duties could be commenced, together with copies of three recent testimonials, to be received not later than Monday, July 10th.

JOHNSTONE WRIGHT, M.I.E.E.,
City Electrical Engineer & Business Manager.

Electricity Works, East Bridge Street, Belfast.
June 27th, 1922. 943

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

A COMPETENT Electrician, one used to organising and estimating, plant or otherwise.—H, 260, Shirland Road, Paddington, W.9. 6326

ABLE Travellers can earn excellent commission on new electrical device.—Apply, stating area covered, 6312, Electrical Review, 4, Ludgate Hill, London.

AN old-established firm of electrical and mechanical engineers require the services of a first-class d.c. and a.c. Motor Designer, and with mechanical design experience. To a first-class man who could supervise works, and work on up-to-date lines, this job would be of a progressive character. A man who is prepared to adopt and cultivate team work would be appreciated and liberally treated.—905, Electrical Review, 4, Ludgate Hill, London.

ASSISTANT required, with experience of power cable contracts.—Please state age, wages required, &c., 827, Electrical Review, 4, Ludgate Hill, London.

ASSISTANT required for estimating and designing l.t. iron-clad boards and switchgear. No attention will be paid to applicants who do not give full particulars as to experience, &c.—902, Electrical Review, 4, Ludgate Hill, London.

CAPABLE Man required to take charge of telephone cords department. Must have all-round experience in the manufacture of Post Office telephone cords.—945, Electrical Review, 4, Ludgate Hill, London.

CLERICAL Assistant (Junior) for supply company, West London, for statistics, &c.—Apply fully, 949, Electrical Review, 4, Ludgate Hill, London.

CONTRACTOR in Midlands requires smart young man, with practical knowledge of installation work; able and willing to canvass. Salary and commission.—State age, experience, and remuneration expected.—6180, Electrical Review, 4, Ludgate Hill, London.

DRIVERS and Firemen invited to apply for positions as Organisers for the North-Eastern, Yorkshire, Midland and South Wales and Southern divisions of the Electricity Supply Enginemens' and Firemens' National Association.—Apply Secretary, 627, Liverpool Road, Platt Bridge, Wigan. 6205

ELECTRICAL Heating and Cooking.—Draughtsman and Designer wanted, with shop experience preferred (Birmingham district).—Apply, stating qualifications, age, and salary required, 6351, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

ELECTRICAL contractors require Young Man with knowledge of electrical installations, able and willing to canvass. Salary and commission.—State experience, 6354, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN (competent non-union), of good appearance and address, to carry out repairs on domestic electrical apparatus, cookers, &c. Only first-class men need apply.—948, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer required (estimating and supervising) for high-class country and town installation work.—Reply, stating qualifications, experience, and salary required, 901, Electrical Review, 4, Ludgate Hill, London.

LADY Demonstrator, of good address (for West End showroom) to call on customers, demonstrate electrical apparatus, and solicit orders. Salary and commission.—Write fully, 947, Electrical Review, 4, Ludgate Hill, London.

LONDON Traveller required.—State terms and experience by letter only in the first instance to The Wholesale Electric (1922), Ltd., Dominion Works, Dunsmure Road, N.16. 6321

MANAGER and Sales Organiser required by an old electrical house making a speciality distributed by the wholesale trade. Must be a gentleman able to secure business and travel G. B. with an undeniable record. An opportunity will be given to take the place of a retiring partner if he makes good.—State qualifications, &c., 6157, Electrical Review, 4, Ludgate Hill, London.

MANAGER Electrical Department required to a leading builders, decorators and shopfitters, W.C. district. Must be fully experienced, able to run department on its own. Careful estimator and keen supervisor. One with good connection preferable. Salary and commission on results. Splendid opportunity for right man.—References, to 925, Electrical Review, 4, Ludgate Hill, London.

METER Repairer and Fixer wanted. Apply, stating experience, age, married or single, and enclose testimonials. Salary £2 19s. 9d., subject to "cost of living" adjustments.—William Frisby, Borough Electrical Engineer, Electricity Works, Colchester. 939

REPRESENTATIVE wanted, by a firm manufacturing wires and cables for London, Midlands, and East Coast districts. Write, stating full particulars as to experience, terms, &c. Applications will be treated in strict confidence.—899, Electrical Review, 4, Ludgate Hill, London.

REQUIRED in electrical manufacturing firm, situated just outside London, a highly skilled Draughtsman and Designer for high and low tension switchboard work.—State age, previous experience, and salary required, 928, Electrical Review, 4, Ludgate Hill, London.

SMART and energetic Traveller required, with established connection among contractors in London and suburbs, to represent firm handling fittings and accessories. Salary and commission.—6394, Electrical Review, 4, Ludgate Hill, London.

TRAVELLER required for London district and Midlands, to call upon motor car and motor car accessory suppliers as well as electrical houses. Liberal terms to capable and experienced man.—944, Electrical Review, 4, Ludgate Hill, London.

WANTED, a competent working Colliery Electrician, thoroughly competent to maintain extensive three-phase high-tension plant and to make repairs and re-wind motors.—Apply, stating age, experience, and wages, to 815, Electrical Review, 4, Ludgate Hill, London.

WANTED, an Electrical Engineer for large iron and steel works near the East Coast. Applicants must be thoroughly experienced in the maintenance and upkeep of all plant and appurtenances connected with generating and transmitting power for all purposes, and be conversant with the most economic and up-to-date methods of running the whole of the electrical equipment. Suitable house available.—Applications, giving age, experience, and salary required, together with recent references, to 6331, Electrical Review, 4, Ludgate Hill, London.

WANTED for a Lancashire colliery, experienced Electrical Engineer, to take entire charge of plant; two 500-kW turbo sets, larger motors working at 3,000 volts, smaller at 550 volts; considerable extensions now in hand. Permanent job for capable energetic man. Salary £6 per week.—890, Electrical Review, 4, Ludgate Hill, London.

WANTED, for small electrical accessory works just commencing, a working production Manager, capable of producing new models, making drawings, costing, and attending to all details prior to and during manufacture.—State terms and experience in confidence to 921, Electrical Review, 4, Ludgate Hill, London.

APPOINTMENTS FILLED.

THE Post of Assistant for the Scarborough Electric Supply Co., Ltd., has been filled by the appointment of Mr. Fitzwater, of Dundee. 958

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that advertisers notify us to that effect when they have arrived at a decision. We will then insert a notice free of charge under this heading.

BOX 6056 (Assistant); Box 6135 (Sales Manager); Box 630 (Shift Engineer); Rhondda Tramways Co. (Assistant Engineer).

SITUATIONS WANTED.

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

A.A.A.—Electrician, with mechanical experience, plant or wiring; anywhere.—Land, 71, Kenthouse Road, Sydenham. 'Phone 1372. 6309

A.A.A.—Electrical Mechanic (30), life experience erection, testing, and maintenance d.c. machinery and switchgear of all types, desires progressive post. Competent tester, faultsman and fitter. Certified technical knowledge. References and full particulars.—Apply Kinch, Rushford, Thetford, Norfolk. 6289

A.A.—Wireman wishes employment; lighting, power factory, private installations, town or country.—Goodwin, 137, Sulgrave Road, Hammersmith. 6288

A CAPABLE, young Improver; Student I.E.E.; 5 years' practical and technical training; armature winding and general maintenance.—"Electromotive," 29, Cambridge Road, Barking. 6138

A CHIEF Electrical Artificer, 12 years Royal Navy, five years' apprenticeship previous, requires position with electrical firm. Thorough knowledge theoretical and practical, care, maintenance and repair dynamos, alternators, motors, lifts, 'phones, wireless installations and instruments, experimental and new ideas. Emergency repair work a speciality. Power station and plant experience. "Exceptional" papers. Four years charge electricians and shops. Would accept charge or otherwise to commence. Full particulars or interview.—"Electrical," 85, St. Mary's Road, Watford. 6363

A COMPETENT Engineer-Electrician (25), 10 years' experience, seeks situation; good all-round practical experience in a.c., d.c. power, lighting, d.c. armature winding and general engineering.—6262, Electrical Review, 4, Ludgate Hill, London.

A COMPETENT Electrician, experienced in vice and machine work; lighting, power, private plants, domestic appliances; seeks position. Industrious, good timekeeper.—6335, Electrical Review, 4, Ludgate Hill, London.

A FIRST-Class Wireman wants work; 20 years' practical experience, lighting and power, charge or otherwise; London, country; excellent references.—"Lektric," 325, Wickham Street, Welling. 6306

A STUDENT I.E.E. (20), with sound practical and theoretical knowledge, desires progressive situation. Experienced plant, power, lighting, &c., references, good mechanic, home or abroad.—"S.I.E.E.," 12, Henry Road, East Ham. 6353

A YOUNG Gentleman, smart appearance (24), desires situation; estimating; travelling. Now with well-known motor firm.—18, Oakhill Road, S.W.15. 6220

A YOUNG man seeks situation, experience in the manufacture and testing of instruments from cheapest meters to highest class telegraph apparatus. Initiative and capacity for hard work.—6333, Electrical Review, 4, Ludgate Hill, London.

A.C.G.I., A.M.I.E.E., Assoc.M.Inst.C.E. (34), 14 years' experience all branches power distribution.—6365, Electrical Review, 4, Ludgate Hill, London.

A.C.G.I., B.Sc., works training; extensive practical experience, excellent references. Position desired with prospects.—6212, Electrical Review, 4, Ludgate Hill, London.

ADVERTISER requires responsible position. 22 years' practical experience in electrical installations with London contractors, accustomed to supervise; buying, office routine.—6208, Electrical Review, 4, Ludgate Hill, London.

ADVERTISER (22) desires practical experience in electrical works; three years engineering college, student I.E.E., organiser, experience fuel economy (gas and steam plant).—6191, Electrical Review, 4, Ludgate Hill, London.

ADVERTISER, ex-Service (23, single), seeks situation; three years' thorough technical training in electrical engineering, also mechanical. Good practical experience in electrical engineering required.—6250, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

ADVERTISER, with large and varied experience throughout electrical power stations covering 18 years, seeks Assistant Engineer or similar position.—Advertiser, "B," 2, Garfield House, Farnham Street, Quorn, Leicestershire. 6261

ADVERTISER seeks permanent situation; long experience, construction or maintenance; good wireman.—Bearman, 43, Cambridge Road, Barking. 6194

ADVERTISER (21), 5½ years fractional h.p. motors and heating apparatus; test-room eyperience, also X-rays and electro-medical apparatus; disengaged July 17th; London district.—6240, Electrical Review, 4, Ludgate Hill, London.

ADVERTISER (20), desires practical experience in electrical works; three years' engineering diplomas; student I.E.E.—6323, Electrical Review, 4, Ludgate Hill, London.

AMBITIOUS Student (18), 3 years' technical training; certificates, testimonial, diploma, desires situation.—6301, Electrical Review, 4, Ludgate Hill, London.

AN all-round practical Electrician, 14 years' experience, including apprenticeship; erection or running and maintenance of engines, generators, storage batteries, and wiring installations. Any offer considered.—6375, Electrical Review, 4, Ludgate Hill, London.

AN electrical and mechanical desires a Position of Trust with electrical contractors or small power station. Would invest for security or for new business.—6158, Electrical Review, 4, Ludgate Hill, London.

AN Electrician, disengaged; power, lighting, bells, &c.; conscientious, 12 years' experience; reference.—"Electrician," 12, Winkfield Road, Wood Green, N.22. 6372

ANGLO-Swedish Electrical Engineer, with 12 years' experience in England and Sweden, seeks position in technical or commercial capacity in either country, with firm where the advertiser's dual training can be turned into account.—6336, Electrical Review, 4, Ludgate Hill, London.

ARMATURE Winder (first-class), 10 years' experience; a.c., d.c.; repairs, rewinds, commutator assembling, &c.—"Armature," 21, Osterley Street, Swansea. 6177

ARMATURE Winder, 12 years' experience, a.c. and d.c., all classes new and repair work.—6192, Electrical Review, 4, Ludgate Hill, London.

ARMATURE Winder, 20 years' practical experience.—J. S., 15, Stirling Road, Plaistow, E.13. 6221

ARMATURE Winder, 11 years' practical experience motor repair. Good theoretical knowledge. Could supervise.—6271, Electrical Review, 4, Ludgate Hill, London.

ASSISTANT, four years' electrical experience, age 20, seeks situation; good references.—H. Miller, 69, Netherwood Road, W.14. 6328

B.SC. Eng. (London), ex-officer, 2½ years electrical shops and test-bed, age 27, requires technical or design appointment with electrical firm.—6334, Electrical Review, 4, Ludgate Hill, London.

CAPABLE Electrical Engineer (31), requires Post in charge of electrical plant and installation of country mansion or large estate; 15 years' experience of installation and plant work (petrol and oil); 1st class certificate and medal in Guilds Exam.; with present firm since 1910; during war in charge of power house and electrical equipment of aircraft in R.A.F. Squadron.—6223, Electrical Review, 4, Ludgate Hill, London.

CAPABLE Electrical Mechanical Engineer and Clerk of Works; large country house experience, capable all repairs to plant, machinery, alterations buildings; age 45, no family.—6277, Electrical Review, 4, Ludgate Hill, London.

CAPABLE Electrician-Wireman desires situation; all systems, lighting, bells, telephones, motors, &c.; any district.—10, Lynwood Road, Tooting. 6381

CLERK, 10 years' experience electricity accounts, requires temporary or permanent post. Keen and energetic. Good references. Moderate salary.—6339, Electrical Review, 4, Ludgate Hill, London.

COLLIERY Electrician (25), single, eight years' experience, erection and maintenance, surface and underground; thoroughly conversant with Mines Regulation Act; a.c., d.c.; good references.—6166, Electrical Review, 4 Ludgate Hill, London.

CONTRACTOR'S Assistant or Manager (age 35), 18 years' practical experience all branches contracting, estimating, interviewing, canvassing; could introduce some work from architect; last situation 10 years; London.—"Electrician," 68, Sydenham Road, N. Croydon. 6356

DRAUGHTSMAN, junior electrical, age 21, desirous of gaining experience, seeks post; moderate salary, knowledge of h.t. and l.t. switchgear, sub-stations, building construction; excellent references.—6357, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

ELECTRIC Cooker Expert. Working Foreman, charge of staff of supply company's hire department, controlling over 500 cookers in London area, seeks situation in similar capacity. Free July 1st.—Stuart, 75, St. Johns Hill, S.W.11. 6167

ELECTRICAL Engineer (22), experienced steam, gas and oil-driven plants, h.t. and l.t. switchgear, &c., seeks position as junior engineer or switchman. Excellent references.—6373, Electrical Review, 4, Ludgate Hill, London.

ELECTRIC Heating and Cooking.—A live man of integrity (32), with many years' actual experience in all phases of efficient production of this apparatus, desires new appointment as Works Manager, Assistant, or Sales Engineer, with scope for energy and new ideas. Accustomed to responsibility and the control of workshops and staff. Moderate salary. Birmingham district essential.—6196, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer (22), Faraday House diploma, student I.E.E., works experience, highest references, desires situation with any electrical concern.—Bronsdon, 185, Brondesbury Park, N.W. 6359

ELECTRICAL Fitter (foreman) requires change; 18 years' first-class experience on country house and general installation, telephones, repairs and testing.—E. S., 5, Alexandra Mansions, W.12. 6213

ELECTRICAL Improver desires employment, having completed apprenticeship. Some knowledge of wireless.—6374, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Student requires berth as Improver; two years London University.—R., 138, Lewisham High Road, New Cross, S.E. 6188

ELECTRICAL Wireman and Fitter; good all-round experience.—Payne, 56, Crowndale Road, St. Pancras. 6272

ELECTRICIAN (age 28), 11 years' experience lighting, power, bells, and 'phones, repairs and maintenance. Reference.—"Electric," 13, Moselle Avenue, Wood Green, London, N.22. 6285

ELECTRICIAN (age 36), with practical experience a.c. and d.c., power and lighting in factories.—Rotor, 126, Latimer Road, North Kensington, W.10. 6360

ELECTRICIAN, bells, lighting, telephones, power, &c., town or country.—F. H., 7, Barnsdale Road, Paddington. 6266

ELECTRICIAN, experienced mechanic; lighting, bells, 'phones, motors, a.c. or d.c.—"Electrician," 325, Kilburn Lane, N.W. 6382

ELECTRICIAN, first-class, highest references, wants work.—6378, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN requires charge of plant or maintenance; country preferred.—6307, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN; 21 years' experience power, lighting, installations and maintenance. References.—6219, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN (disengaged).—E. C., 35, Valentine's Road, Ilford. 6248

ELECTRICIAN (good); fill in time handy-man; any distance.—"Electrician," 33D, Deacon Street, Walworth. 6270

ELECTRICIAN-Engineer seeks charge of electric light plant; suction gas, oil and steam, private and workshop experience, electric wiring, pumps.—Bugden, Lane End, Bucks. 6284

ELECTRICIAN-Improver (20), five years' experience power, light, and 'phones.—S., 44, Chichester Road, Tonbridge. 6347

ELECTRICIANS (two) require situations with contractors or on maintenance; 15 years' experience in all branches.—M., 8, Denton Street, S.W.18. 6349

ELECTRICIAN'S Improver requires Work; smart and willing worker; all systems.—Write W. M., 9, Ross Road, Stratford, E. 6168

ELECTRICIAN'S Improver or Mate requires work; any system; three years' technical and practical experience.—F. Tolhurst, The Cottage, Ewell House, Ewell, Surrey. 6322

ELECTRICIAN-Mechanic; lighting, heating, power, telephones, bells, country house installations and maintenance; good all-round knowledge.—James, 19, Whitworth Road, South Norwood. 6269

ELECTRICIAN-Wireman, experienced man all branches; reliable workman; town, country.—113, Albert Street, N.W.1. 6298

ELECTRICIAN-Wireman, good all-round, 20 years' experience.—F., 41, Spencer Street, Battersea. 6380

SITUATIONS WANTED.—*Continued.*

ELECTRICIAN-Wireman, thoroughly reliable; all kinds of wiring, tubing, casing, &c.—G., 40, Rattray Road, Brixton. 6302

ENGINEER-in-Charge (experienced), disengaged.—6387, Electrical Review, 4, Ludgate Hill, London.

ENGINEER, with 20 years' practical and commercial experience home and abroad, seeks position of responsibility. Heavy installation work, plant, sales management, workshop control and factory maintenance. Excellent credentials.—6389, Electrical Review, 4, Ludgate Hill, London.

ENGLISHMAN, with extensive American manufacturing experience and electric power plant, college graduate (London) seeks executive position with good opportunity for quick advancement.—State offer of salary, H. Reid, 767, East 179 Street, New York, U.S.A. 6245

ESTATE Electrician Engineer.—Charge of country house, water, &c., by fully qualified man, over twenty years' previous, and four years' present employ. Steam, oil and suction gas experience. Exceptional testimonials and references. No house required.—"Engineer," Great Chalfield Manor, Melksham, Wilts. 6215

EX-Apprentice desires post as Improver or Student-Improver; premium if necessary. Has experience of suction-gas engines, d.c. dynamos, batteries, motors, wiring, &c.—Apply Vowles, Bagley, Wedmore, Somerset. 6160

EXPERIENCED Electrician, a.c., d.c., would like position as Traveller to insurance company or any reliable firm, provincial.—6364, Electrical Review, 4, Ludgate Hill, London.

EXPERT, press tools, jigs, fixtures, and production methods, at liberty shortly, desires re-engagement. Small electrical apparatus or similar. Age 36. D.O., works, and toolroom experience. Control of men.—6348, Electrical Review, 4, Ludgate Hill, London.

FIBRE Sawyer and Wood Machinist desires work anywhere, experienced in turbine and rotor work, &c.; sharpen saws, cutters; work to drawings.—"Machinist," 37, St. Joseph Road, Lower Edmonton, London, N.9. 6181

FOREMAN, mechanical, electrical, works, maintenance.—6386, Electrical Review, 4, Ludgate Hill, London.

IMPROVER (20), requires situation; power, 'phones, wiring.—M., 23, Wotton Road, Cricklewood. 6225

INSTRUMENT Mechanic, 20 years' experience electrical, telegraph, wireless; used tool making, drawings, micrometer; good reference; moderate wage.—Write "F," 29, Dering Road, Croydon. 6159

JOINTER-Plumber, all-round man; good experience of mains work, meter fixing and motors.—6292, Electrical Review, 4, Ludgate Hill, London.

PLANT Engineer (31), with 14 years' electrical, mechanical, technical experience, millwright production, D.O., stores, desires position as assistant on plant of manufacturing concern, or would enter supply station.—6342, Electrical Review, 4, Ludgate Hill, London.

PLUMBER, experienced, reliable, desires progressive position with electrical firm, cable jointing or other capacity.—6227, Electrical Review, 4, Ludgate Hill, London.

QUALIFIED Wireless Operator (aged 22) requires post, P.M.G. certificate, two years' sea experience, complete knowledge installation amateur sets, knowledge bookkeeping, typing, good correspondent; anything offering prospects; will go abroad; excellent references.—Write "D.A.," c/o Streets, 30, Cornhill, E.C.3. 951

SALES or Commercial Manager or Traveller; wide experience; good connection with stations, factors, and contractors throughout country.—6388, Electrical Review, 4, Ludgate Hill, London.

STOREKEEPER (experienced electrical and engineering); card system.—6376, Electrical Review, 4, Ludgate Hill, London.

STOREKEEPER, electrical, gas, steam, card-index, packer, disengaged.—J. Cartridge, 183, Hollydale Road, S.E.15. 6384

SWITCHBOARD Attendant, or Junior Shift-Engineer, desires post; experience modern h.t. station, age 23, ambitious, good references.—W., 5, Headquarters, Princetown. 6371

TELEPHONE Manufacturers.—Engineer (31), 12 years' experience, manufacture of telephone components, estimating in detail, costing.—C. B. Strowger, 6350, Electrical Review, 4, Ludgate Hill, London.

TURBINE Driver (29) seeks situation; experience with high-speed and high-pressure turbines, also mixed pressure; good reference.—Chambers, 23, Cardiff Road, Bargoed, South Wales. 6352

WANTED, odd wiring jobs, repairs, builders or ironmongers.—11, Spa Road, Bermondsey. 6226

SITUATIONS WANTED.—*Continued.*

WIRELESS.—Advertiser, 12 years' experience various branches wireless, seeks situation; purchase and sale of wireless installations and accessories; pre-war commercial experience, electrical stores, &c.—6385, Electrical Review, 4, Ludgate Hill, London.

WIREMAN, experienced, any system; good all-round man.—Weston, 146, Westmoreland Road, Walworth. 6273

WIREMAN wants work; all systems.—W. T., 75, Fortune Gate Road, Harlesden, N.W.10. 6239

WIREMAN (experienced), installations, repairs, and maintenance; age 30.—Roster, 12, Winkfield Road, Wood Green, London, N. 6286

WIREMAN, good experience lighting, power, 'phones, and maintenance; good references.—Holmes, 17, Skelbrook Street, Wandsworth, S.W.18. 6224

WIREMAN; all branches; wants work.—Haines, 4, Seaton Street, N.W.1. 6218

WIREMAN wants job, any system.—Robinson, 5, Agincourt Road, Hampstead, N.W. 6216

WIREMAN-Electrician disengaged; lighting, bells, maintenance, &c.—F. S., 34, George Street, Salisbury. 6295

WORKS Electrician, 15 years' varied experience large d.c. plants; excellent references.—6329, Electrical Review, 4, Ludgate Hill, London.

YOUTH (16), requires situation in workshop, garage preferred; three years' technical training, including practical work. Good reference.—Payne, 19, Manor Road, Tottenham, N.17. 6238

YOUTH (20), wants post with good electrical firm; well educated.—6379, Electrical Review, 4, Ludgate Hill, London.

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MOTORS FOR SALE.

MOTORS: Various d.c., new, 1 to 4 h.p., 220/480 volts, 1,000/1,200 r.p.m.

Motors: A.c., second-hand, with starters and switchgear:—

Phœnix, 30 h.p., 220 volts, 50 cycles, 960 r.p.m., 2-phase.
Brooks, 3 h.p., 220 volts, 50 cycles, 1,440 r.p.m., single-phase.
Rhodes, 5 h.p., 220 volts, 50 cycles, 960 r.p.m., single-phase.
Brooks, 50 h.p., 200 volts, 50 cycles, 960 r.p.m., 2-phase.
Crypto, 10 h.p., 200 volts, 50 cycles, 1,440 r.p.m., 2-phase.
B.T.H., 30 h.p., 200 volts, 50 cycles, 960 r.p.m., 2-phase.
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SIMOON, 23a, Bramber Road, W.14. 843

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FOR Sale, 11 Motors, 25 h.p., 3-phase, 440 volts, 25 cycles, squirrel cage, bare shafts, no slides. Machines left over from war contract. Never left works. G.E.C. make, with starters.—Harpin & Co., Ltd., Ruskin Chambers, Corporation Street, Birmingham. 684

New Direct-coupled Generating Sets for Paraffin or Gas.

50-KW "Aster-Siemens," 110/220-220/550 volts, d.c.
50 kW "Aster-Siemens," 110/220-220/540 volts, a.c., 3-phase, 50 cycles.

20 kW "Keighley-Holmes," 220 volt, d.c., complete with static balancer gear for 3-wire system.

All the above sets are brand new and complete with all spares, fuel and water tanks, switchboards, &c., in unopened cases, as originally sent out by the makers. Offered at less than half the makers' prices.

Also a number of surplus 50/100 kW, 200/520 volts, brand new, "Siemens," 3-phase Alternators, complete with exciters and switchboards, for sale very cheap, as they are in our way and we want the room.

Full particulars, photos and lowest prices from—
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NEW MOTORS. SPECIAL PRICES.

MAKER'S Guarantee—stock replaced as sold.

SQUIRREL CAGE.	SLIP RING.
1, 2, 3 and 4 h.p.	SINGLE 5, 6, 7½, 10 and 15 h.p.
950 and 1,440 r.p.m.	PHASE. 950 and 1,440 r.p.m.
1, 3½, 5, 6, 7½ & 10 h.p.	THREE 3½, 5, 5½, 7½, 10 and 15 h.p.
750 and 1,440 r.p.m.	PHASE. 750, 950, and 1,440 r.p.m.

Several good S.H. Motors at attractive prices.

ELECTRICAL INSTALLATIONS, LTD., 27, Martin Lane, E.C.4. 2

FOR SALE.—*Continued.*

MYLAN & SMITH (ENGINEERS), LTD.,
KELVIN HOUSE.
St. James' Street, Sheffield.

'Phone: 4976, 4977 Central, Sheffield.
'Grams: "Topical," Sheffield.
Electrical Stores, Bamford, Derbyshire, Midland Railway.

Electric Motors from Stock.

TWO-PHASE, 50 PERIODS, 200 VOLT (4-WIRE).

One 10 h.p., 960 revs., squirrel cage, B.T.H.
One 15 h.p., 710 revs., squirrel cage, Westinghouse.
One 20 h.p., 720 revs., slip-ring, G.E.C.
One 40 h.p., 720 revs., slip-ring, Phœnix.
One 50 h.p., 480 revs., slip-ring, B.T.H.

THREE-PHASE, 25 PERIODS, 400/440 VOLTS.

Four 2 h.p., 1,440 revs., squirrel cage, Brook.
Eleven 7½ h.p., 1,440 revs., squirrel cage, Phœnix.

THREE-PHASE, 40 PERIODS, 400/440 VOLTS.

Fifteen 4 h.p., 1,160 revs., squirrel cage, Siemens.
Two 60 h.p., 770 revs., slip-ring, Eng. Elec. Co.
One 72 h.p., 760 revs., slip-ring, Eng. Elec. Co.

THREE-PHASE, 50 PERIODS, 400/440 VOLTS.

One 1 h.p., 1,400 revs., squirrel cage, Laing.
Two 2 h.p., 700 revs., slip-ring, Westinghouse.
One 2 h.p., 1,440 revs., squirrel cage, B.T.H.
Fifteen 4 h.p., 1,440 revs., squirrel cage, Siemens.
Twelve 6 h.p., 1,460 revs., squirrel cage, G.E.C.
One 6 h.p., 2,850 revs., squirrel cage, Fuller.
Eleven 7½ h.p., 1,440 revs., slip-ring, E.C.C.
One 10 h.p., 570 revs., slip-ring, L.D. & M.
One 10.5 h.p., 710 revs., slip-ring, L.D. & M.
Two 50 h.p., 580 revs., slip-ring, E.C.C.
One 60 h.p., 930 revs., slip-ring, B.T.H.
Two 66 h.p., 970 revs., slip-ring, Eng. Elec. Co.
Two 80 h.p., 580 revs., slip-ring, B.T.H.
One 80 h.p., 950 revs., slip-ring, Eng. Elec. Co.
One 100 h.p., 480 revs., squirrel cage, E.C.C.
One 130 h.p., 242 revs., slip-ring, Westinghouse.

THREE-PHASE, 50 PERIODS, 500/550 VOLTS.

Fifteen 5 h.p., 1,440 revs., squirrel cage, Siemens.
Two 75 h.p., 970 revs., slip-ring, Eng. Elec. Co.
One 90 h.p., 950 revs., slip-ring, Eng. Elec. Co.

THREE-PHASE, 50 PERIODS, 3,000/3,300 VOLTS.

One 550 h.p., 291 revs., slip-ring, B.T.H.

DIRECT-CURRENT, 110 VOLTS.

One 1/6 h.p., 1,700 revs., compound wound, B.T.H.
One ¼ h.p., 1,000/2,200 revs., shunt wound, Mawdsley.
One ¼ h.p., 1,600 revs., shunt wound, City Elec. Co.
One ½ h.p., 1,500 revs., shunt wound, Cutting.
One ½ h.p., 1,300 revs., shunt wound, Siemens.
One ½ h.p., 1,600 revs., shunt wound, Cutting.
Nine ½ h.p., 1,350/1,500 revs., shunt wound, G.E.C.
Six ¾ h.p., 800/1,400 revs., shunt wound, G.E.C.
Two 1 h.p., 750/2,000 revs., compound wound, Mawdsley.
Two 1 h.p., 1,800 revs., shunt wound, Crompton.
One 1 h.p., 1,600 revs., shunt wound, Crompton.
One 1 h.p., 1,500 revs., shunt wound, Crompton.
One 1 h.p., 1,425 revs., shunt wound, B.T.H.
Four 1 h.p., 1,300 revs., shunt wound, Cutting.
One 1 h.p., 1,000 revs., shunt wound, B.T.H.
One 1 h.p., 400/1,000 revs., shunt wound, E.C.C.
Two 1 h.p., 815 revs., shunt wound, Mawdsley.
One 1 h.p., 750 revs., shunt wound, Mawdsley.
One 1¼ h.p., 1,600 revs., shunt wound, Crompton.
One 1½ h.p., 1,700 revs., shunt wound, B.T.H.
Three 1½ h.p., 1,700 revs., shunt wound, G.E.C.
One 2 h.p., 750/2,000 revs., shunt wound, Mawdsley.
Five 2 h.p., 1,500 revs., shunt wound, Phœnix.
Four 2 h.p., 580/1,400 revs., compound wound, B.T.H.
One 2 h.p., 1,250 revs., shunt wound, Westinghouse.
One 2 h.p., 1,200 revs., shunt wound, Cutting.
One 2 h.p., 800/1,400 revs., shunt wound, Vickers.
Four 2 h.p., 900 revs., shunt wound, E.C.C.
One 2 h.p., 850 revs., shunt wound, Higgs Bros.
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Six 2½ h.p., 630 revs., shunt wound, Phœnix.
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Four 3 h.p., 1,050 revs., shunt wound, Cutting.
One 3½ h.p., 1,080 revs., shunt wound, Electromotors.
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WE WILL QUOTE YOU
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OR RETURN OF POST.

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All Machines Guaranteed.

ONLY best makes. Nearly all new, thoroughly overhauled and tested before despatch.

DIRECT CURRENT, 110 VOLTS.—(*Continued*)

One 4 h.p., 1,600 revs., shunt wound, Rees Roturbo.
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One 4 h.p., 1,000 revs., shunt wound, Westinghouse.
One 5 h.p., 1,450 revs., shunt wound, E.C.C.
One 5 h.p., 1,060 revs., shunt wound, Phœnix.
One 5 h.p., 1,000 revs., compound wound, Mawdsley.
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One 6 h.p., 1,300 revs., shunt wound, E.C.C.
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One ¼ h.p., 250/2,000 revs., shunt wound, Crypto.
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One ¼ h.p., 2,000 revs., shunt wound, Crypto.
One ¼ h.p., 1,000/2,000 revs., shunt wound, Mawdsley.
One ½ h.p., 1,650 revs., shunt wound, G.E.C.
One ½ h.p., 750/1,500 revs., shunt wound, Crypto.
One 2 h.p., 2,400 revs., shunt wound, Cutting.
One 2 h.p., 1,425 revs., shunt wound, Mawdsley.
One 2 h.p., 1,150 revs., shunt wound, G.E.C.
Three 2 h.p., 1,000 revs., shunt wound, Higgs Bros.
One 2 h.p., 1,000 revs., shunt wound, Boothroyd.
Five 2 h.p., 500/1,500 revs., compound wound, Mawdsley.
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Two 9 h.p., 800 revs., shunt wound, Mayor & Coulson.
One 9 h.p., 450 revs., shunt wound, Siemens.
One 10 h.p., 1,000 revs., shunt wound, E.C.C.
One 10 h.p., 950 revs., shunt wound, Westinghouse.
One 10 h.p., 920 revs., shunt wound, Phœnix.
One 10 h.p., 870 revs., shunt wound, Phœnix.
One 10 h.p., 750 revs., shunt wound, Vickers, Ltd.
One 13 h.p., 750 revs., series wound, Westinghouse.
One 15 h.p., 900 revs., shunt wound, Siemens.
One 15 h.p., 900 revs., shunt wound, Brush.
One 15 h.p., 900 revs., shunt wound, Brush.
Twelve 15 h.p., 700 revs., shunt wound, Westinghouse.
One 15 h.p., 625 revs., shunt wound, Westinghouse.
One 15 h.p., 620 revs., shunt wound, W. H. Allen & Co.
One 15 h.p., 600 revs., compound wound, Westinghouse.
One 16 h.p., 1,440/1,650 revs., shunt wound, Siemens.
One 18 h.p., 1,600/1,750 revs., shunt wound, Mather and Platt.
One 18.3 h.p., 1,450 revs., shunt wound, Siemens.
One 20 h.p., 1,200 revs., shunt wound, B.T.H.
Four 25 h.p., 700 revs., shunt wound, Westinghouse.
Three 29 h.p., 620 revs., shunt wound, Westinghouse.
One 31 h.p., 780 revs., shunt wound, Brush.
One 35 h.p., 880 revs., shunt wound, Westinghouse.

DIRECT-CURRENT, 440/500 VOLTS.

One 2 h.p., 1,600 revs., shunt wound, Westinghouse, 440 volts.
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One 20 h.p., 420 revs., traction type, Dick-Kerr, 500 volts.
One 250 h.p., 485 revs., compound wound, Phœnix, 500 volts.

Suitable control gear, slide rails and pulleys are always available for the above machines.

Write for Monthly Stock List.

MYLAN & SMITH (ENGINEERS), LTD.
Kelvin House, St. James' Street, Sheffield.

'Phone: 4976, 4977 Central, Sheffield.
'Grams: "Topical," Sheffield.
Electrical Stores, Bamford, Derbyshire, Midland Railway.

FOR SALE.—*Continued.*

MOTORS, STARTING AND CONTROL GEAR.

ONE-Phase, 200-440 volts, slip-ring and squirrel cage. Number in stock: six. 3, 4, 6 and 10 h.p.

Two and three phase.—200-550 volts, slip-ring and squirrel cage.

Seven.—4, 6, 7, 10, 12, 20, 25, 30, 40, 50, 60 h.p., d.c., 100-200, 440, 500-550 volts.

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Four.—Special, 25, 30, 40 h.p., totally enclosed, compound wound, with pulleys, rails, controllers and starters complete.

Several Generating Sets, petrol-paraffin. 1-60 kW, 3-phase, and d.c., 400-550 volts, with switch gear, oil-immersed, automatic features.

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Fifty.—Starting and Control Panels, oil-immersed, 2 and 3-phase, 200-500 volts, with automatic features.

126.—D.c., d.a. Starters, ¼ to 60 h.p.

Seventy-Eight.—Star Delta and series parallel Starters, with automatic features.

Three.—Motor Generator Sets.
Motors: 400-500 volts.
Generator: 80-100 volts, 100 amps.
Motors: 220-440 volts.
Generator: 35 volts, 20 amps.

Machine Tools.—Electric Drills and Grinders. Universal motors.

Drilling Machines.—No. 1, 2, 3, and 4 sizes.

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Large stocks of other tools.

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3,000 yards 3/22, 7/20, 7/14, to 37/12, V.I.R. Cable.

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The above stocks are all new, direct from the best of British manufacturers. Fully guaranteed. Inspection invited our works, also Hereford Street, Sheffield.

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Your inquiries, please, at either address.

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Halifax Corporation Electricity Department.

THE Tramways & Electricity Committee of the Halifax Corporation have for sale the following plant:—

Two Babcock & Wilcox Water-Tube Boilers, complete with Chain-grate Stokers.

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Tenders for the above plant should be delivered to the Town Clerk, Town Hall, Halifax, not later than Saturday, July 8th, 1922.

The highest or any tender not necessarily accepted.

(By Order) PERCY SAUNDERS,
Town Clerk

Town Hall, Halifax.
June 10th, 1922. 764

FOR SALE.

A KEEN LAMP PROPOSITION.

LAMPS, HALF-WATT PATTERN (ALL VOLTAGES).
(Guaranteed not to infringe any patents.)

100 WATT, 3s 3d. each; 30, 40, 60 watt, 2s. 3d. each.

METAL FILAMENTS.

High voltage, 18s. a doz.; low voltage, 16s. a doz.
Quotations subject 3½ per cent. for cash with order. All orders of one dozen or over carriage paid. Defective lamps replaced.

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Telephone: City 8952. 381

FOR SALE.—*Continued.*

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Three 1,000-kW British Westinghouse Rotary Converters.
Two 700-kW Thomson Rotary Converters.
Two 400-kW Westinghouse Rotary Converters.
One 250-kW Browett, Lindley d.c. Steam Set.
One 400-h.p., 25-cycle, 5,500-V British-Thomson Motor.
Six 350-h.p. British Westinghouse 2-phase Motors.
Ask for complete list of plant for sale (No. 455).

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FOR SALE.

DIESEL Engines, six cylinder, two and four-stroke; 850, 1,000, 1,200 h.p.; excellent condition. Dynamos for above, 250 or 500 volts, d.c. Immediate delivery and low price.

Two 500-kW Parsons Turbine Sets, 250 or 500 volts, d.c., with condensing plant and spare armature; price £2,200.

Electrical-driven Centrifugal, Ram, and other Pumps, from 1¼ in. to 10 in. outlet.

JENNINGS, West Walls, Newcastle-on-Tyne. 5

MOTORS FOR SALE.

NEW a.c. and d.c. Motors, at present in stock, will be sold below makers' present costs. Write for particulars. The undermentioned are a few of the larger motors for disposal:—

D.C., 440 VOLTS.

Two Flather, 50 h.p., 660 r.p.m.; new.
One Crompton, 55 h.p., 775 r.p.m.; nearly new.
Three Crompton, 30 h.p., 700 r.p.m.; new.
Three Newton, 29 h.p., 700 r.p.m.; new.
One Phœnix, 30 h.p., 750 r.p.m.; nearly new.
One Verity, 25 h.p., 850 r.p.m.; new.
One Crompton, 25 h.p., 900 r.p.m.; new.
One Vickers, 25 h.p., 775 r.p.m.; equal to new.
One Westinghouse, 30 h.p., 400 volts, 300/900 r.p.m.; equal to new.
One Mawdsley, 20 h.p., 1,050 r.p.m.; new.
One Verity, 20 h.p., 900 r.p.m.; new.
Three Flather, 20 h.p., 700 r.p.m.; new.
One Mawdsley, 18 h.p., 950 r.p.m; new.
One Verity, 15 h.p., 950 r.p.m.; new.
&c., &c.

THREE-PHASE, 25 CYCLES, 440 VOLTS. (C. & S.C.)

One A.S.E.A., 140 h.p., 480 r.p.m.
One Brook, 35 h.p., 480 r.p.m.
Two Crompton, 30 h.p., 750 r.p.m.
One Siemens, 27 h.p., 720 r.p.m.
One A.S.E.A., 27 h.p., 720 r.p.m.
Two Crompton, 20 h.p., 750 r.p.m.
Two Verity, 18 h.p., 720 r.p.m.
One A.S.E.A., 18 h.p., 720 r.p.m.
One Wright, 40 h.p., 575 r.p.m., 400 volts, 3-phase, 50 cycles.
One Rayner & Heald, 35 h.p., 200 volt, 950 r.p.m., 2-phase, 50 cycles.
One Rayner & Heald, 30 h.p., 200 volt, 960 r.p.m., 2-phase 50 cycles.
One Siemens, 28 h.p., 200 volt, 750 r.p.m., 2-phase, 50 cycles.
Two Brook, 25 h.p., 200 volt, 750 r.p.m., 2-phase, 50 cycles.
One Crompton, 20 h.p., 200 volt, 750 r.p.m., 2-phase, 50 cycles. &c., &c.

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Lancaster Street, Birmingham. 586

ELECTRICAL AND WIRELESS ACCESSORIES.

Special Offer.

ELECTRIC LAMPS. METAL FILAMENT.
100/120 volt, 1s. 2d.; 200/250 volt, 1s. 4d.
20, 30, 40, 60 watts.

HELICAL (¼-Watt pattern).
100 watts, 3s.; 60 watts, 2s.

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WIRELESS HEAD 'PHONES.
4,400 ohms, best American, 35s. pair.

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BARGAINS FOR ELECTRICAL ENGINEERS.

Large Stocks Ready for Immediate Dispatch.

DETAILED PRICE LIST SENT UPON APPLICATION.

NEW Cables (V.I.R.) by the best British makers, from 1/18 to 37/12, also 3-core cab-tire Cables, lead-covered ditto and workshop flex.

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Large assortment of these lamps, including gasfilled and automobile, all new. 50 per cent. allowed off vacuum and 42½ per cent. off gasfilled.

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Great assortment of new accessories and fittings, including I.C. goods and Switchboard Gear.

New Motors, Generators, Meters, &c., &c., &c.

Special Offer: 7/18 V.I.R. Cable, Assoc., 2,500 meg. grade, 25s. per 110 yds.; 3/22 single lead-covered Cable, 20s. per 100 yds.; 3/22 V.I.R. Cable, 2,500 meg. grade, doubly taped, "Callender's" and "Connolly Bros.'" makes, red and black twisted, 85s. per 880-yd. drum; or black only, drums free.

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Large assorted stock of Insulators and Cleats, special offer 2½-in. in 2-groove glazed English Cleats, 5s. 6d. per 100 pairs.

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ONE only, Keighley Electrical Co., 20 h.p., 460 volt, shunt interpole, 600 r.p.m. Complete with pulley, slide rails and starter, equal new. Price £65, f.o.r.

One only, Victoria Electric Plant Co. (Cutting make), 30 h.p., 460 volts, shunt interpole, 860 r.p.m. New condition, £85, f.o.r.

One only, Electromotors, totally enclosed, 10 h.p., 500 volt, 460 r.p.m., with Brookhirst controller. £50, f.o.r.

Two only, Ventilating Fans, by Matthews & Yates, complete with valves for hot or cold air, 5 h.p., 220 volt, d.c. Motors, Brookhirst controllers, new condition, £45 each. F.o.r.

One only, Hodgson, 400 volt, 3-phase, 50 cycles, S.C.R., 720 r.p.m., pulley, slide rails, Ellison starter, equal new. £50, f.o.r.

One only, Westinghouse, 100 h.p., 440 volts, 3-phase, 25 cycles, 480 r.p.m. Pulley and slide rails, new, never run. £130, f.o.r.

RAMSBOTTOM, RIX & Co., Keighley. 935

FOR SALE.

THREE Peache Crompton 85 kW, 110 volt, d.c. Generating Sets, 125 lb.

One Motor Booster Set: input 110 volts, output 160 amperes, 10/50 volts.

One Weir Boiler Feed Pump, 2,450 gallons per hour.

H. A. NEALE & Co., 116, High Holborn, W.C.1. 924

FOR SALE.

22 8-kW Gardner-Electromotors Petrol Electric Generating Sets, 80 volts, 1,000 r.p.m., complete with radiator, silencer, &c., all mounted on common baseplate. Very little used, and in first-class condition. £90 each.—Fyfe, Wilson and Co., Ltd., 31, Budge Row, London, E.C.4. Telephone: City, 2602. Telegrams: "Ductility, Phone, London." 953

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ELECTRIC Motors and Dynamos.—Machines always available. ARMATURES and FIELD COILS rewound or repaired without delay.

'Phone: Museum 8080. MACDONALD, SYER & CO., LTD., 295, Gray's Inn Road, W.C.1. 6

FOR SALE.—*Continued.*

FOR SALE.

50-H.P., 44-V, 3-phase, 40 cycle Bruce Peebles Motors, 760 revs., with Ellison starter. 3, 6, and 10 h.p., 110-volt Motors.

22-kW, 230-volt, compound Dynamo and Motors, 4/30 h.p. 10, 15, 20 and 30-h.p., 440/460 volt, Siemens shunt protected Motors, almost new.

DRUMMOND & Co., Middlesbrough. 491

FOR SALE. *ALL NEW.

TWO Turbos (Westinghouse), 625 kW, steam 150 lbs., vacuum 28 in., 3,600 r.p.m. Two Generators (direct coupled), 780 kVA, 3-phase, 60 periods, 2,300 V. Price £3,000. (Would separate.)

*Fifteen Transformers (oil 45 gall. capacity), 37½ kVA, 60 cyl., 2,210 to 110/220, 2,300 to 115/230-2,400 to 120/140; £50 each.

*Two Induction Motors (Alliss-Chalmers), 100 h.p., 2,300 V, 60 cyl., 690 r.p.m.; £175 each.

*One Induction Motor (Allis-Chalmers), 50 h.p., 2,000 g.p.m., 150 ft. head, 1,750 r.p.m., coupled direct on bedplate to Allis pump; £125.

*Three ditto, 600 g.p.m., £100 each. One 40-h.p. ditto, £100. One ditto, 60 h.p., 2,000 g.p.m., 60 ft. head, £125. One ditto, 7½ h.p., 150 g.p.m., £25. One Turbo-Generator (Westinghouse), d.c., 25 kW, 125 V, 200 amps., 3,500 r.p.m.; Price £125.

Steam Turbine, 50 h.p. (Westinghouse); price £60.

*Auto-Starter, 15/30 h.p., 200 V; Auto-Starter Switch, 4,000 V. Two Auto-Trans., 38 h.p., 4,000 V, 60 cyl.; £75 lot.

*Two G.E.C. Controllers; 2 Field Rheostats; 25/100-h.p. I.G. Rheostat; Oil Circuit Breaker; Nine-Instrument Trans.; Volt Regulator; Potential Starter; Three Switchboard Panels (slate); 12 Steam Gauges.

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Low price accepted for immediate clearance. Offers to Liquidator, H. E. Thompson, 22, Nevern Square, Earl's Court. 'Phone City 4606. 6355

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Telephone: 8620 City, Manchester.

D.C. MOTORS IN STOCK.

Volts.	B.h.p.	Speed.	Make.
440	200	485	Vickers
440	27	980	Westinghouse
460	25	820	Mersey
440	25	445	Mather
440	16/20	200/600	Electromotors
440	15	930	E.C.C.
440	10	1150	Wright
400	8	1000	Crompton
440	2	600	Phœnix
440	1	1200	Electromotors
250	60	400	G.E.C.
220	25	545	Phœnix
220	20	1100	G.E.C.
220	16	960	English Electric
220	10	720	Phœnix
220	10	850	E.C.C.

A.C. Motors, 3-phase, 50 cycles, 400/440 and 200/220 volts, in stock.

All at bargain prices. 927

FOR SALE.

4-h.p. Electromotors, 440 V, d.c., revs. 970, £15.
4-h.p. Electromotors, 440 V, d.c., revs. 650, £23.
7.5-h.p. Electromotors, 400 V, d.c., revs. 425, £20.
7-h.p. Electromotors, 460 V, d.c., revs. 1,150, £30.
5-h.p. Electromotors, 440 V, d.c., revs. 550, £25.
5-h.p. B.T.H., 440 V, d.c., revs. 1,200, £20.

The above complete with pulleys, slide-rails and starters. Morris Hawkins Dynamo, 8/16 amps., volts 130, r.p.m. 920/1,650, complete with panel, 2 meters, voltmeter, auto cut-out, choke coils and arresters, £25, running order.

G. H. LUNN, 25, Station Road, Willesden Junction, N.W.10. 6358

FOR SALE.

ONE Generating Set, by B.T.H. (new), comprising slip-ring Motor, 316 h.p., 400/440 volts, 3-phase, 50 periods, 720 revs., direct coupled to 216-kilowatt Generator, 180/320 volts, d.c., with all starting gear. In original cases. Price £450.

Telegrams: "Contact." R. F. WINDER,
Telephone: 20,461 (2 lines). Belgrave Electrical Works, Leeds. 28

FOR SALE.—*Continued.*

ROTARY CONVERTERS, MOTOR GENERATOR SETS AND D.C. & A.C. MOTORS, &c.

250-kW Rotary Converter, Westinghouse, new 1918, 10,000 volts a.c., 50 cycles, 3-phase, to 240 volts, d.c.

250-kW Rotary Converter, 6,000/6,600 volts, 50 cycles, 3-phase, to 500 volts, d.c., shunt.

500-kW Rotary Converter, Westinghouse, 3-phase, 50 cycles, 480 volts, d.c., compound, with switch panels; h.t. transformers supplied to suit clients' supply.

500-kW Crompton Motor Generator, almost new, combined bedplate, 240 volts to 470 volts, with switch panels.

SPECIAL OFFER D.C. MOTORS—110 TO 500 VOLTS.

Make.	H.P.	Volts.	Revs.	Price.
Westinghouse	11	110	620	£28
,,	15	110	400/1200	£47
,,	20	110	650	£38
Crompton	22	110	725	
Westinghouse	30 (9)	110	850	£60
,,	40 (5)	110	520	£70
,,	55	110	570	£75
,,	100	110	500	£150
Lancs. D.	10 (4)	220	600	£39
Veritys	20	220	675	£68
G.E.C.	30 (4)	220	500	£80
Dick, Kerr	50 (3)	220	450	£107
Crompton	200	400	360/480	£300
Lancs. Dynamo	85	420	630	£190
Union	85	500	1000	£180
B.T.H.	160	500	500	£275

A.C. MOTORS—3-PHASE, 50 CYCLES.

Make.	H.P.	Volts.	Revs.	Price.
Lahmeyer	450	210	231	
Clayton	40	400	360	£90
Mather & Platt	55	400	1000	£110
Phœnix	400	415	487	£700
B.T.H.	100 (2)	550	720	£250

A.C. MOTORS—2-PHASE, 50 CYCLES.

Fuller	10 (2)	200	950	£27
,,	10 (encl)	200	720	£33
,,	15	200	960	£42
,,	16	200	960	£42
,,	20 (2)	200	720	£42
,,	60	200	720	£104

DYNAMOS AND ALTERNATORS.

Make.	KW.	Volts.	Revs.
Cutting	4	4/10	700
Crompton	40	110	800
Westinghouse	180	110	200
Stevens	18	230	550
B.T.H.	125	440	575
Elec. Co.	200	480	350
Westinghouse	80 (2)	200	250, 3 ph., 50 cyc.
Lahmeyer	240	210	333, 3 ph., 50 cyc.
Hall	95	400	750, 3 ph., 50 cyc.
Phœnix	132	400	428, 3 ph., 50 cyc.

BRITISH CENTRAL ELECTRICAL CO., LTD.,
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'Phone: Holborn 5848. 'Grams: "Briticent, Holborn, London."

FOR SALE.

ONE Turbine (Willans & Robinson-Parsons reaction type). H.p. 1,600, kW 1,200, r.p.m. 1,200, steam pressure 200 lb., with Westinghouse alternator, 3-phase, 2,000 kW, 105 amps., 11,000 volts, 40 periods.
One Surface Condenser.
One three-crank Edwards Air Pump.
One 10-in. Gwynnes centrifugal circulating Water Pump.
Complete. Just stopped work.
Can be seen running, and will be sold very cheap.
A duplicate set as above also for disposal.
Three Rotary Converters, 157 kW, suitable 2,030/2,340 amps., at d.c. voltage 75/85 volts, complete with panels.
One 15-ton overhead hand Crane, span 32 ft. 2 in. (Herbert Morris, Ltd.).
Price and further particulars on application.
F. J. REAY & Co., Iron and Steel Merchants & Dismantlers, Guildhall Chambers, Newcastle-on-Tyne.
Teleg.: "Scrap, Newcastle-on-Tyne." Telep.: City 468. 6337

FOR IMMEDIATE DISPOSAL.

ONE 100-volt Lighting Set, comprising 135-volt, 16-amp. shunt Dynamo at 1,450 revs.; 150 Ah E.P.S. Battery (57 cells), with Switchboard and Instruments, by Christy Bros.
C. HOBBS, Streatley-on-Thames, Berks. 6327

FOR SALE.—*Continued.*

Advertisements are inserted under this heading at 1s. 9d. per line.

A.A.A. Metal Filament and Automobile Lamps from stock at greatly reduced prices. Send for terms.—Essex Electric Stores, 19, Wilson Street, E.C.2. 6278

A LALLEY Lighting Set, complete with 16-cell Battery; output 1,250 watts, 30/32 volts, 2½ h.p., two-stroke Engine, Storage Battery, Water Tank, and Switchboard. Only recently installed. In splendid condition.—Offers for above to be made to R. S. Balden & Son, 22, Bond Street, Dewsbury. 913

ACCESSORIES: Nuts, terminals, cut-outs, plugs and sockets, accumulator boxes.—Write: Rapid Accumulator Co., Hayes (Middlesex). 933

A.C. Motor, 7.5 h.p., 25 frequency, 440 volts 710 revs., L.E. Co. make, as new, £20.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6392

ADAPTORS, hard wood, 4s. per doz.; bayonet Holders, C.G.S.C., 5s. per doz. Enamel Shades, blue-white, 5s. 6d. per doz.; gross quantities only.—Engineering and Mercantile Co., Ltd., Chancery Lane, W.C.1. 6377

AT 9, Colonial Avenue, Minories, E.1, near Aldgate Station, stocks of d.c. and a.c. Dynamos, Motors, Batteries, Cable, Tape, Wire, Electric Drills and Wireless Sets are kept.—Leslie Dixon & Co. Tel. No.: Avenue 4166. 30

BELLISS & Morcom, 20-h.p. Oil Engine (magnificent job), enclosed type, on cast iron bed. Low price for immediate sale.—Harry H. Gardam & Co., Ltd., Staines. 605

COMPLETE Lighting Plant, consisting of 4½ h.p. Hornsby oil engine, 2½ kW, 50-75 volt dynamo, belt-driven, battery charging switchboard, 28 9-plate Chloride cells, 200 ampere-hour capacity. Can be seen running near London. Price £200, or near offer.—931, Electrical Review, 4, Ludgate Hill, London.

DIESEL Twin-Cylinder Engine, 160 h.p., by Carels Freres, with Tangye centrifugal pump, cooling tower and tank, necessary oil tanks and pump. Compound 100-kW, d.c. Generator; panels fitted with suitable instruments. Three-ton hand-travelling Crane, &c., together with Corrugated Iron Building, 24 ft. high, 37½ ft. long, 21 ft. wide, glazed brick and matchboarding inside; roof half glazed.—917, Electrical Review, 4, Ludgate Hill, London.

DIRECT-Coupled "Witton" Motor Generator; motor single-phase, 200 V, 60 cycles, 1,730 r.p.m.; generator 1 kW, 100 V, 10 A. Little used; £25.—Uneedus, Carshalton Road Sutton. 6244

DIRECT coupled Generating Set, 35/37 V. 20 A, Pelsphone-Crompton, price £45.—White, 140, Southwark Street. 6144

DIRECT-Current Motors, new and second-hand, up to 500 volt, in stock. Keenest buyers only need apply.—"A" Dept., Midland Dynamo Co., Leicester. 19

EARTHING Clips, in copper, all sizes, ¼ in. to 2 in., in stock; three types of terminals, our own make. Write for trade sheet. New reduced prices.—Isaacson & Brown, Ltd., 39, Furnival Street, Holborn, E.C.1. 9

ELECTRIC Fans (new), 200 G.E.C. Freezor fans, 12 in., 110 volts, 50 cycles, commutator type, alternating current, £4 5s. each, carriage paid, cash with order. Large stocks of telephone and telegraph apparatus (new). Special terms to trade.—J. Jarvis, 18, Ravenswood Road, Balham, London, S.W.12. 'Phone: Streatham, 2481. 6361

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EXCELLO Flame Arc Lamps for sale; about 120 alternating current Lamps, in good working order, manufactured by the Union Electric Co. Offers invited.—932, Electrical Review, 4, Ludgate Hill, London.

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FOR Sale or Hire, Motors and Dynamos, 440, 220, 110 volts.—Martin, 320, Witton Road, Birmingham. 'Phone: East 883. 7

FOR Sale, 40/30 Flexible Copper Cable, rubber covered, £8 per mile. Electric motor wall brackets, £3 each.—W. A. Burdett, Longford, Coventry. 758

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FOR SALE.—*Continued.*

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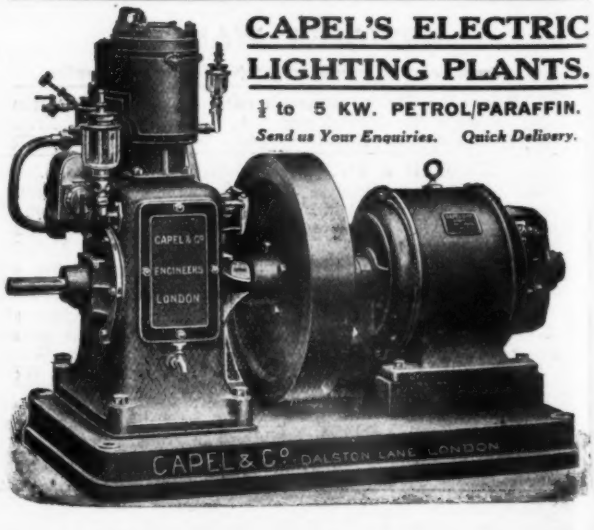

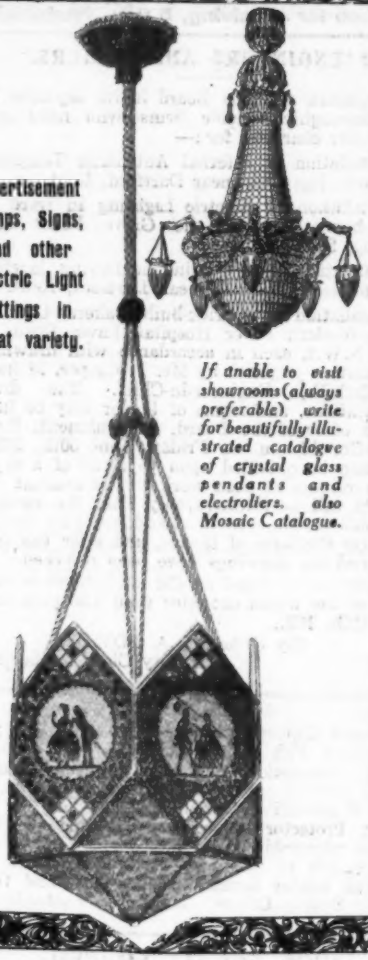

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THE SHROPSHIRE, WORCESTERSHIRE, AND STAFFORDSHIRE ELECTRIC POWER COMPANY.

QUESTION OF SUPPLY IN SOUTH-WEST MIDLANDS.

The ordinary general meeting of the Shropshire, Worcestershire, and Staffordshire Electric Power Co. was held at Electrical Federation Offices, 88, Kingsway, W.C., on Thursday, June 22nd, Mr. William L. Madgen (chairman and managing director) presiding.

The Chairman, in moving the adoption of the report and accounts, said that a great change had recently taken place in connection with electric supply. It was now to be observed that the progress of electric supply, although very slow to commence, had, during the past few years, undergone a remarkable change both in the use for power and for domestic purposes.

With regard to their own company, the volume of business done and the net profits obtained during the year 1921 had not been so large as in the previous year. The obvious explanation, of course, is that the coal strike, extending over several months, suspended most industrial operations, and, moreover, inaugurated a very severe depression in trade generally, from which we have not yet emerged, though there are favourable indications of a slow revival. The figures for the past year are not, however, wholly unsatisfactory.

To put it shortly, the figures for the past year are as in 1919, only better. The conditions which have obtained since the termination of hostilities are so abnormal, and, in some respects, so extraordinary, that it may be well that I should impress upon you the salient figures for the years 1918, 1919, and 1920. In the year 1918 we had the largest output of electricity; we sold over 62 million units, producing a gross revenue of £289,476. Immediately following the Armistice there was a precipitous fall in the production of war materials, and the units sold during 1919 amounted only to 33 millions, producing a gross revenue of £204,195. During the year 1920 there was a rapid change-over from the production of war materials to normal industrial production, and in that year we sold over 54 million units, producing a gross revenue of £369,500. Then, as I have said, in 1921, we had the coal strike, followed by general depression, and the total units sold was 34¼ million, producing gross revenue of £266,000.

The figures for the past year, therefore, are better than those for 1919, but the gross figures I have mentioned express only a small part of the improvement. When we saw what was taking place, we immediately took all practical steps, which were facilitated by the downward tendency of prices and wages generally, to reduce the cost of production, and the most rigid economies were effected in every department, with the result that the net revenue for 1921 is only £3,300 less than the net revenue obtained in 1920 on an enormously larger output at a much greater gross revenue.

The sale of electricity for power purposes is, in the case of our area, an accurate barometer of the general state of trade. During the last few years we have connected up a large number of new consumers, and old consumers have increased their equipments for the employment of electricity; there is a larger potential demand on our generating plant than at any previous period. But notwithstanding all this, the output of electricity from the company's generating station at the present time is only about 50 per cent. of the generating plant installed, showing clearly that the prosperity of this company is very largely dependent upon the state of trade in the district.

I will now give a few explanations of the figures in the balance-sheet. A comparison of the balance-sheet now presented with the preceding balance-sheet will show a marked improvement in the financial standing of the company. We have paid off many of our liabilities; we have improved our reserves and increased our available cash resources. We have been enabled to do this by the issue which we made during the past year of £300,000 7½ per cent. Ten-year Guaranteed Convertible Debenture Stock. The issue was over-subscribed, and has enabled the company to put its finances on a satisfactory basis. It will be seen that the 300,000 issued Ordinary shares of £1 each are now denominated "B" Ordinary shares. That is because an option has been given to the subscribers of the Convertible Debenture stock to exchange that stock at the rate of £100 of Debenture stock for £100 8 per cent. "A" Ordinary shares, and £20 of "B" Ordinary shares of the company. The "A" Ordinary shares will rank for a non-cumulative dividend in priority to the "B" Ordinary shares to the extent of 8 per cent. per annum, and the "A" Ordinary shares will participate thereafter, share for share, in any profits distributed after the "B" Ordinary shares shall have received 8 per cent. dividend. The loan from the Ministry of Munitions has been reduced by the agreed annual instalment of £13,666, which makes, with previous instalments, a total amount repaid of £62,867, leaving a balance outstanding and repayable by annual instalments during the period of twenty years from 1921, of £257,133. The reserve fund now stands at £86,310 after applying the amount appropriated from the sinking fund under the First Debenture trust deed.

Turning to the credit side of the balance-sheet, it will be seen that a sum of £48,617 was expended during the past year upon buildings, plant, machinery, and mains. In a progressive electricity supply undertaking the capital account is never closed, and is rarely stationary, as the plant has to be constantly replaced and extended, and further expenditure is in proportion to the increase in the demand for electricity. The item of investments shows a reduction of £40,000 compared with the preceding year. This reduction is accounted for by the discharge of Second Debenture stock which we held in the Birmingham District Power and Traction Co. This Debenture stock was lodged as part of the security with the Ministry of Munitions, and was released by the Ministry on reduction of the loan to the company. Sundry debtors consists mostly of amounts due to us by consumers, and shows a big reduction, owing to the smaller output of electricity during the year.

During the past year an inquiry was held in the district by the Electricity Commissioners, under the new Electricity Act, for the delimitation of the area, with a view to the constitution of a joint electricity authority for the district. This company, in association with the City of Birmingham, offered no objection to the principle of delimitaton of the area, but made an alternative proposal to the appointment of a joint electricity authority, to the effect that an advisory committee, consisting of two representatives of the Corporation of the City of Birmingham and two representatives of this company, should be constituted to administer the supply of electricity in the South-west Midlands area, including a part of the Shropshire Co.'s statutory area, and of the Parliamentary area of the City of Birmingham. It affords the directors great satisfaction that the Electricity Commissioners have been able to accede to the combined suggestion of the City of Birmingham and the company.

A second inquiry by the Electricity Commissioners has now been fixed to take place at Birmingham on the 29th inst. to give effect to the scheme that has been provisionally formulated, and if the scheme is confirmed as a result of the second inquiry, it will probably be put into effect immediately after the passage of the Electricity (Supply) Bill now before Parliament. Provision is made in the scheme for the erection of the large power station at Stourport, on the Severn, for which this company obtained Parliamentary sanction in 1918. It will involve the expenditure of a considerable amount of capital, and application has been made by the company to the committee appointed by the Treasury under the Trades Facilities Act, 1921, for the guarantee by the Treasury of the capital required for the construction of the power-house and for the connecting mains between the new power-house and the present power-houses of the company at Smethwick, and of the City of Birmingham, at Nechells, &c. The application for this Treasury guarantee is now under consideration by the Electricity Commissioners, and a decision may be expected shortly. If the decision is favourable, a meeting of the shareholders of this company will be called in due course to authorise the constitution of the undertaking of the Stourport power-house as a separate undertaking with separate capital, as authorised by the Shropshire Co.'s Act, 1918.

The Shropshire Co. possesses statutory rights for the supply of electricity north of the South-west Midlands area. This northern portion has been provisionally delimited by the Electricity Commissioners, and it is proposed to constitute a joint electricity authority. I will conclude by moving: "That the report of the directors and the statement of accounts for the year ended December 31st, 1921, be received and adopted, and that the recommendations therein contained be adopted and carried out." I will ask Mr. Garcke kindly to second that.

Mr. E. Garcke seconded the resolution, and it was carried unanimously.

The proceedings then terminated.

OFFICIAL NOTICES.

Latest Time for receiving, 5 p.m. Wednesday.

TO ENGINEERS AND OTHERS.

THE Metropolitan Asylums Board invite separate tenders from thoroughly reliable firms who have executed works of a similar character for:—

(*a*) The installation of Internal Automatic Telephones at the River Hospitals, near Dartford, Kent.

(*b*) The installation of Electric Lighting in ward blocks, boiler-house, &c., at the Grove Fever Hospital, Tooting, S.W.17.

(*c*) The installation of a Continuous Drying Machine, at the Southern Hospital, near Dartford, Kent.

(*d*) The installation of a brick-built Bakers' Oven at the North-Western Fever Hospital, Lawn Road, Hampstead, N.W.3, each in accordance with drawings and specification prepared by Mr. T. Cooper, M.Inst.C.E., M.I.Mech.E., Engineer-in-Chief. The drawings, specifications, and forms of tender may be inspected at the office of the Board, Embankment, E.C.4, on and after 10 a.m. on Friday, June 30th, 1922, and can then be obtained upon payment of a deposit of £1 in respect of each work. The amount of the deposit will be returned only after the receipt of a *bona-fide* tender, sent in accordance with the instructions on the form of tender, and after the specification and the drawings have been returned.

Tenders, addressed as noted on the form, must be delivered at the Office of the Board not later than 2.30 p.m. on Wednesday, July 19th, 1922.

(By Order) G. A. POWELL,
Deputy Clerk to the Board.

923

AUSTRALIA.

WIRE, Tinned Copper, Schedule 31 (August 15th); Cable, Switchboard, Silk and Cotton Covered, Schedule 35 (August 22nd); Automatic Common Battery Telephone Equipment, together with all associated equipment, including equipment for use at subscribers' premises, Schedule 39 and 40 (October 17); Protector Apparatus, Schedule 563 (August 9th). Tenders, returnable on the dates named, are invited by the Commonwealth of Australia for supply of the abovementioned. For tender forms, specifications, and full particulars, apply Supply Officer, Room 101, Australia House, Strand, London. 907

LONDON COUNTY COUNCIL.

TENDERS are invited for the supply, delivery and erection of high-tension Switchgear at the Central Repair Depôt, Charlton. The specification, form of tender, and general conditions may be obtained from the Clerk of the Council, County Hall, Westminster Bridge, S.E.1, on payment to the Cashier of the Council of a deposit of £2, which amount will be returnable on receipt of a *bona-fide* tender. Particulars of the work may be obtained on application at the County Hall before payment of the fee.

Tenders should be addressed to the Clerk of the Council and delivered at the County Hall, Westminster Bridge, S.E.1, not later than 4 p.m. on Monday, July 24th, 1922. No tender received after that time will be considered.

The Council does not bind itself to accept the lowest or any tender.

JAMES BIRD,
Clerk of the London County Council.

900

URBAN DISTRICT COUNCIL OF CONNAH'S QUAY.

Electricity Scheme.

THE Urban District Council of Connah's Quay invite Tenders for the supply, delivery and erection of:—

Sub-Station Equipment, Overhead and Underground Mains, Public Lighting, and Consumers' Services.

Copies of specification, with form of tender and general conditions, can be obtained from the Council's Engineer, Mr. A. J. Leigh, 122, The Albany, Old Hall Street, Liverpool, on payment of three guineas (£3 3s.), which sum will be refunded upon receipt of a bona-fide tender—after the tenders have been considered by the Council. Duplicate copies of specification and conditions to be obtained on payment of one guinea (£1 1s.), which sum is not returnable.

The Council do not bind themselves to accept the lowest or any tender.

Tenders, on the forms supplied, with the envelope, endorsed "Electric Lighting Scheme," must be delivered or sent not later than July 14th, 1922, to the undersigned, Clerk to the Urban District Council, Council Offices, Connah's Quay.

A. J. MOTHERSOLE,
Clerk to the Council.

Council Offices, Connah's Quay,
June 21st, 1922. 886

(*Continued on Sup.* 38).

DOLES——

Stephen Leacock, in "My Discovery of England," says three-quarters of the population of England carries the other quarter on its back.

If you purchase a foreign-made article when you can buy a similar British-made product—*remember*, you are lessening employment of British workmen.

Should your purchase be on the score of cheapness, don't forget the *real* price of such competitive foreign wares is the total of :—

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3. Your share of taxes to pay the thousands of officials who administer the dole; their incidental expenditure, and
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The dole alone now amounts to more than one million pounds weekly.

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FRANK B. COOK ELECTRIC CO., CHICAGO.

OFFICIAL NOTICES.—*Continued from page 36.*

BOROUGH OF GRAVESEND.

Electricity Department.

THE Corporation invite tenders for the following extension:—

Section *a*.—5,000-kW Turbo-Generator.
Section *b*.—Condensing Plant.
Section *c*.—Switchgear.
Section *d*.—Mains.
Section *e*.—Artesian well.
Section *f*.—Automatic Stokers.

Specifications, forms of tender, conditions, &c., may be obtained on application to Mr. C. F. McInnes, M.I.E.E., Borough Electrical Engineer, Electricity Works, Suffolk Road, Gravesend, upon payment of a deposit of £2 2s., which will be returned upon receipt of a *bona-fide* tender. Additional copies of the specification may be obtained on payment of 10s. 6d. per copy.

Sealed tenders, endorsed with the section to which they apply, addressed to the undersigned, should be delivered at my office not later than 12 noon on Monday, July 17th, 1922. The Corporation do not bind themselves to accept the lowest or any tender.

H. H. BROWN, Town Clerk.

841

STATE ELECTRICITY COMMISSION OF VICTORIA.

Tenders for Plant.

TENDERS are hereby invited for the supply, delivery, &c., of the following for the Morwell Power Scheme.

Copies of tender form and specification will be available upon application to:—

Agent General for Victoria,
Melbourne Place, Strand,
London, W.C.2.

Specification No. 261. *Strain and Pin Type Insulators.*

Charge:—
£2 2s. for the first three copies of tender form, conditions of contract, specification and drawing complete. These charges will be returned on receipt of a bona-fide tender. A fourth copy, and any further copies, will be supplied for the sum of 10s. 6d. each.

Preliminary Deposit:—
A preliminary deposit of £100 is to be lodged with tender.

The specifications may be inspected at the above mentioned office.

The Commission does not bind itself to accept the lowest or any tender.

Tenders on prescribed form, properly endorsed and addressed, must be delivered to the undersigned in Melbourne not later than noon, September 16th, 1922.

R. LIDDELOW,
Secretary.

State Electricity Commission of Victoria,
Melbourne, Victoria, Australia. 893

BOROUGH OF SWINDON.

THE Corporation of Swindon invite Tenders for the manufacture, delivery, and erection complete of one Water-Tube Boiler with Superheater, Chain Grate Mechanical Stoker, and necessary Pipework.

Plan, specification, and form of tender can be obtained from the Borough Electrical Engineer, Engineer's Office, Electricity Works, Swindon, upon payment of the sum of one Guinea, which will be returned upon receipt of a bona-fide tender.

Tenders, sealed and endorsed "Steam Raising Plant," and addressed to the undersigned, to be delivered at the Town Hall, Swindon, not later than 12 noon on Monday, July 3rd, 1922.

ROBERT HILTON,
Town Clerk.

Town Hall, Swindon,
June 22nd, 1922. 891

INDIA.

THE High Commissioner for India is prepared to receive tenders for the supply of:—

(1) Automatic Telephone Sets, desk and wall.
(2) Cords for Telephone Switchboards, &c.
(3) Cells of various descriptions for accumulators.

Forms of tender may be obtained from the Director-General, India Store Department, Belvedere Road, Lambeth, S.E.1, and tenders are to be delivered at that office not later than 2 o'clock p.m. on Friday, July 21st, 1922.

T. RYAN,
Director-General.

952

OFFICIAL NOTICES.—*Continued.*

AUSTRALIA.

Telegraph and/or Telephone Apparatus, Testing Instruments, Protective Apparatus (Schedule 734).

TENDERS are received for the above by the Postmaster-General, Perth, Western Australia, up to noon on Wednesday, July 26th, 1922. For tender forms, specifications, &c., apply Supply Officer, Room 101, Australia House, Strand, London, W.C.2. 701

NOTICES RELATING TO PATENTS.

Latest Time for receiving, 5 p.m. Wednesday.

PATENTS, TRADE MARKS & DESIGNS
IN ALL COUNTRIES.
LEWIS WM. GOOLD, CHARTERED PATENT AGENTS,
British Members of the American Patent Law Association and of the Institute of Patent Attorneys of Australia.
INCORPORATING:
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Telegrams: "Diplomacy," B'ham. — *Telephone: Central 2700*
5 CORPORATION STREET, BIRMINGHAM.

PATENTS AND DESIGNS ACTS, 1907 AND 1919.

ELECTRIC ROTARY CONVERTERS.

THE Proprietors of British Letters Patent No. 16,933/15 are prepared to sell the patent or to license British manufacturers to work under it. It relates to a rotary converter, having an automatic switch controlled by the speed of the armature to open and close the outgoing alternating current circuit.

Address: B. W. & T.,
112, Hatton Garden,
894 London, E.C.1.

THE proprietors of Letters Patent No. 131,166, relating to "Method of and apparatus for operating distant devices by means of electromagnetic waves," desire to dispose of their patent or to grant licences to interested parties on reasonable terms with a view to the adequate working of the patent in this country.—Enquiries to be addressed to Cruikshank & Fairweather, 65-66, Chancery Lane, London, W.C.2. 908

EDUCATIONAL NOTICES.

Latest Time for receiving, 5 p.m. Wednesday.

FINSBURY TECHNICAL COLLEGE,
Leonard Street, City Road, E.C.2.

Dean for the Session 1921-22: PROFESSOR W. H. ECCLES, D.Sc., F.R.S.

THE College provides practical scientific training for students who desire to become Civil, Mechanical or Electrical Engineers, or Chemists.

Candidates are required to pass an entrance examination in mathematics and English, but the Matriculation certificate of any British University, and certain other qualifications, are accepted in lieu of it. The next entrance examination will be held on Tuesday, September 19th. Applications for admission should be forwarded to the College on forms to be obtained from the Registrar. The programme of the College is under revision and will be issued shortly. 794

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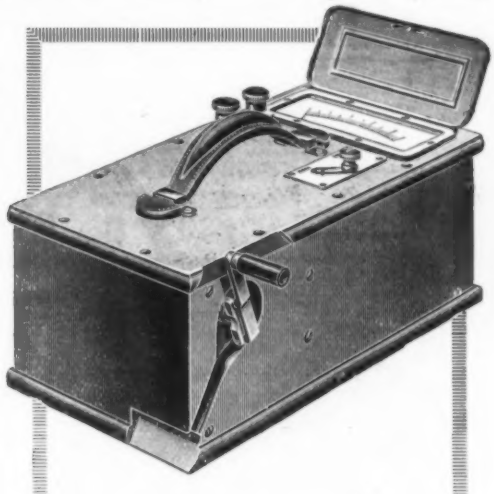

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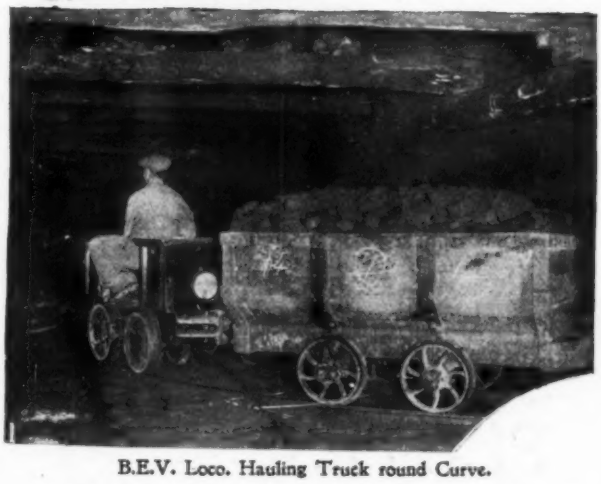

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We designed our Electric Locos. primarily for Messrs. The Ebbw Vale Steel, Iron & Coal Co., Ltd., Irthlingborough, to be used in place of ponies in their iron mines at Irthlingborough.

The first two were put into service in March, 1919, and were so successful that in November, 1919, a further one was put into service, and these have been followed in succession by:—

One in February, 1920,
Two in May, 1920,
Two in August, 1920,
Five in January, 1922,
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making a total of 14 Locos. The repeat orders above clearly show that our Locos. must replace ponies if costs are to be reduced. One Loco. does the work of about six ponies, handling approximately 150 tons, consumption of power costing 1s. 6d. per shift.

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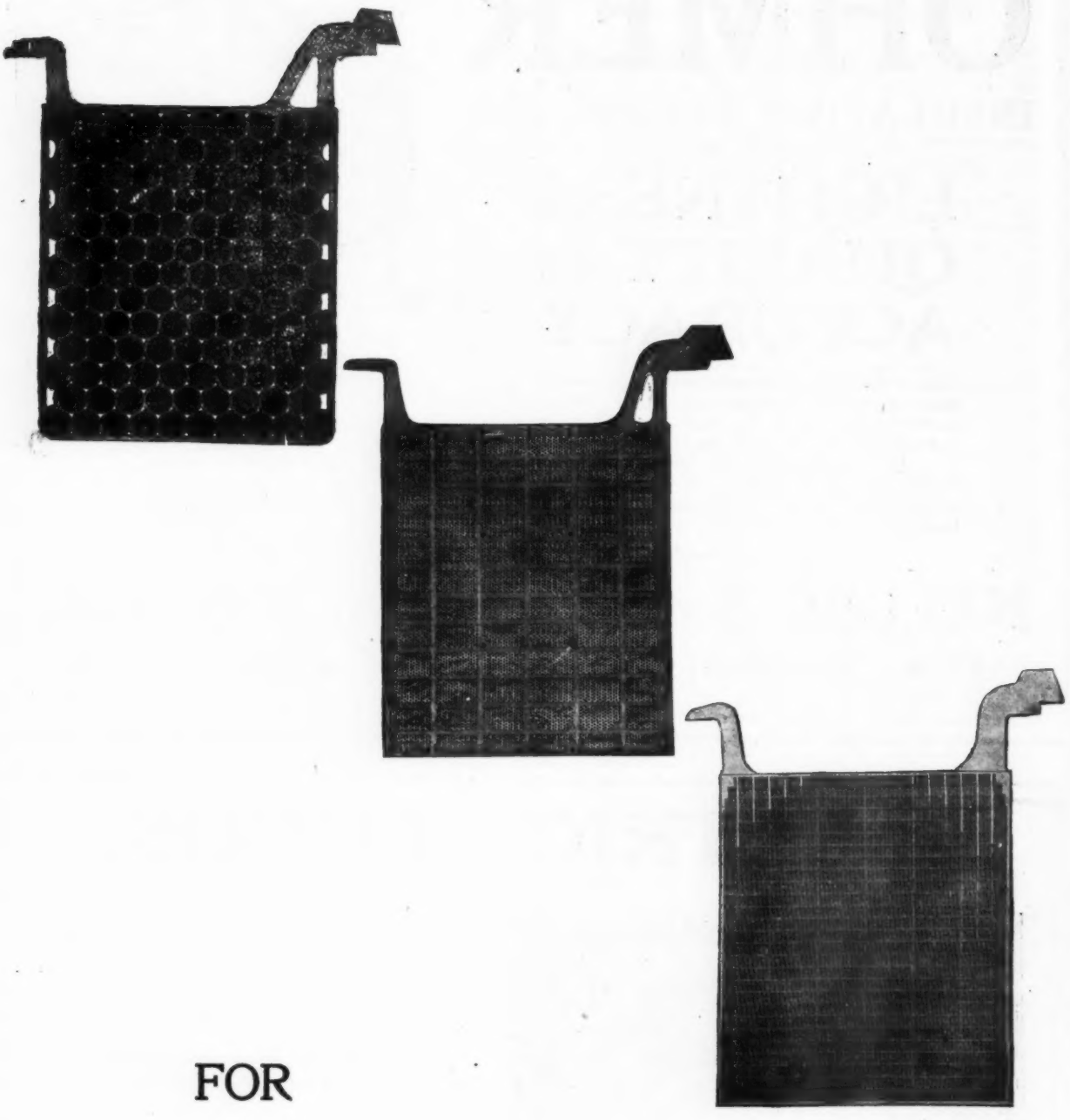

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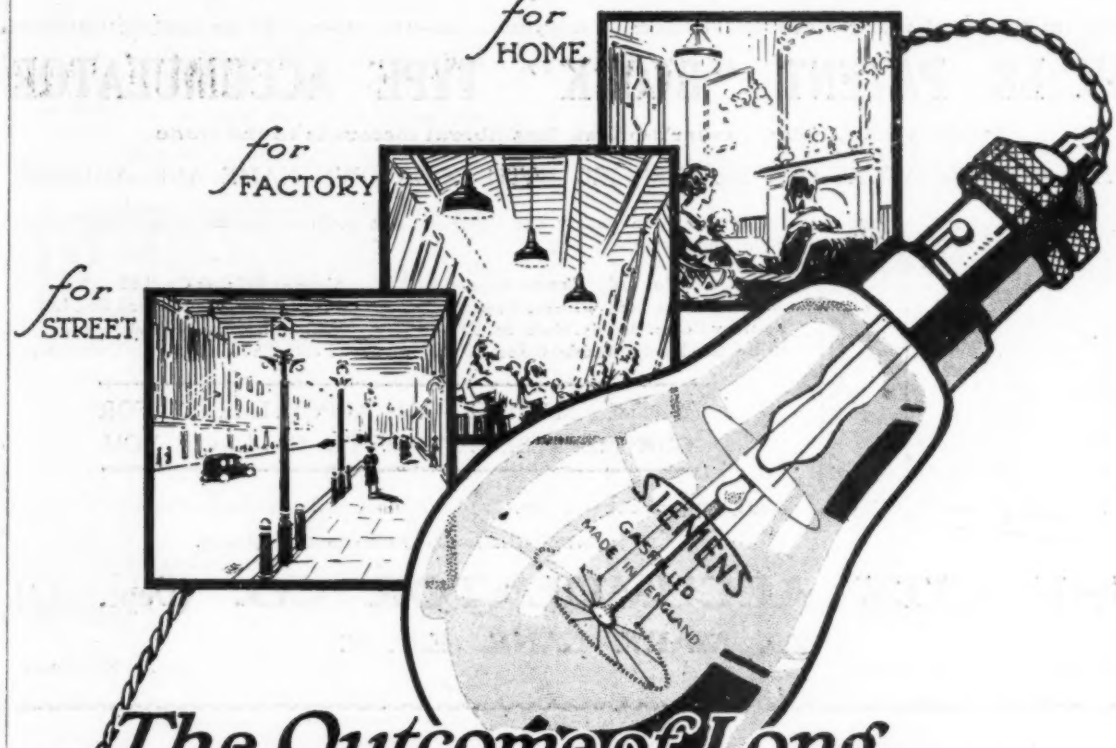
G7



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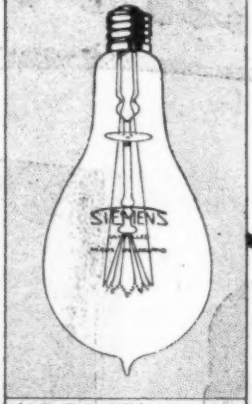

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Above all, it behoves every trader to supply the Amateur with the most efficient components, especially a reliable Accumulator. There is only one Accumulator particularly suited for this purpose, one that is fool-proof and cannot be injured through unskilful treatment, that will hold its charge when not in use, and will not sulphate, and one that you can sell with every confidence, knowing that your customer will not be "let down."

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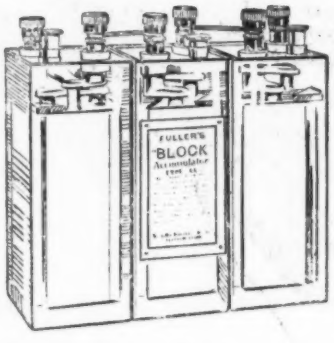

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The first broad discussion of economics as applied to electrical distribution systems.

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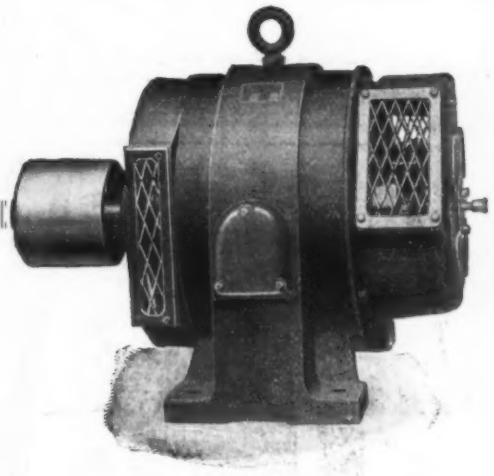

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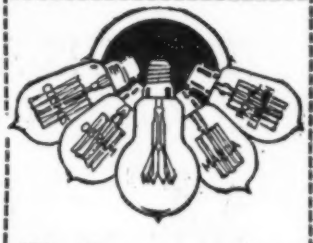

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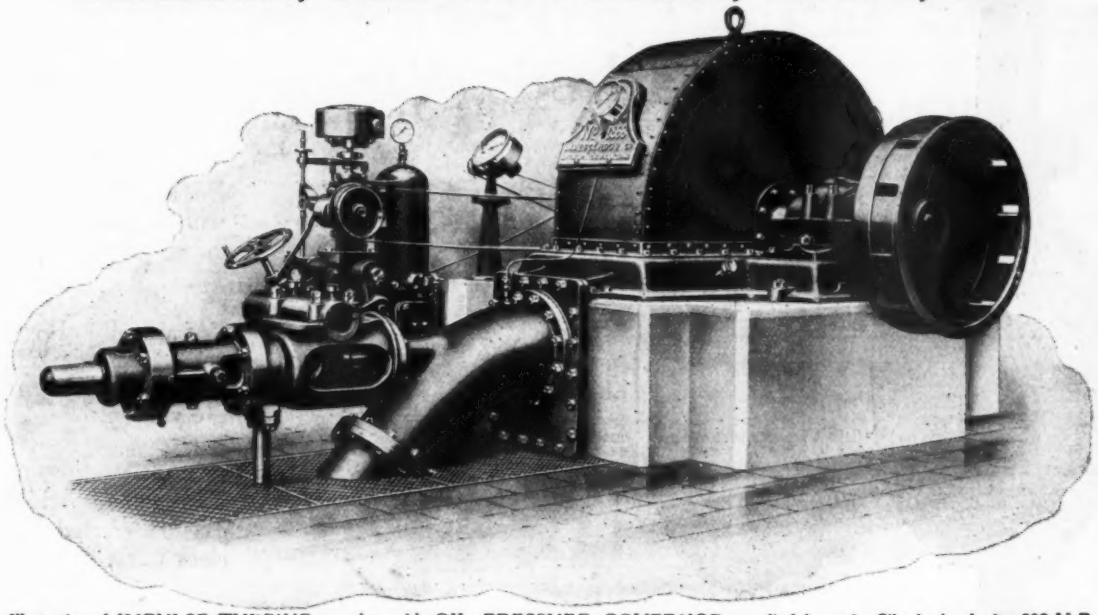

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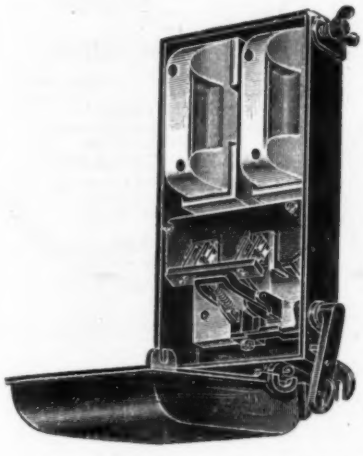

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* * * * *

To intimate acquaintances, who have had the opportunity of a peep behind the scenes, there has been no mystery. For they have realised that new conditions in the trade require new treatment, and that our superficially dormant period has been one of seething activity, in which

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Various improvements in the design of that Switchgear have been introduced.

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Write for details of our Revised Prices.

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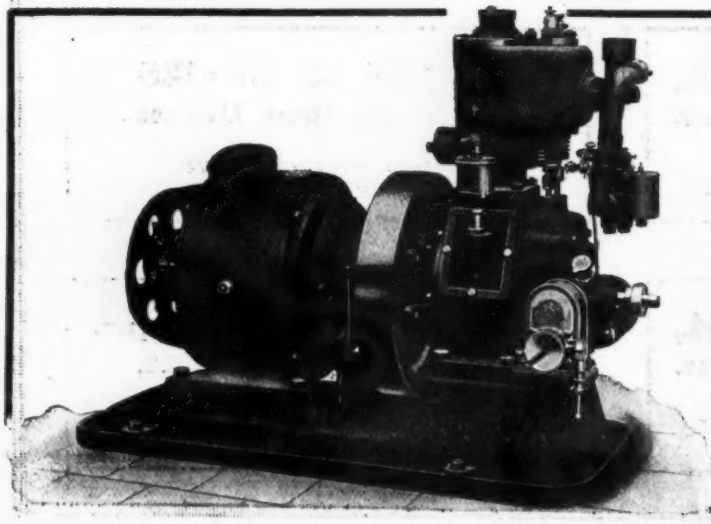
Telegrams: Sanders, Wednesbury. **WEDNESBURY.** *Telephone: 65 Wednesbury.*



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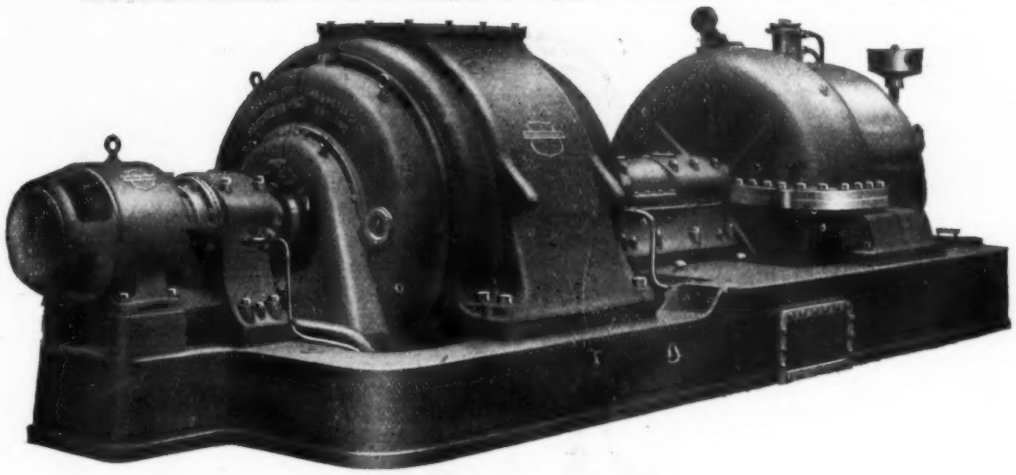

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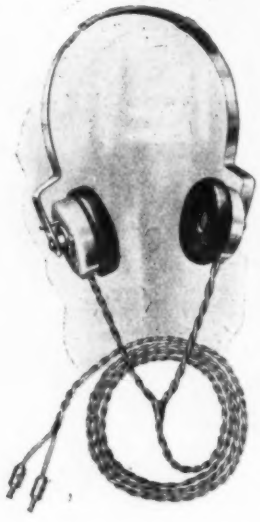

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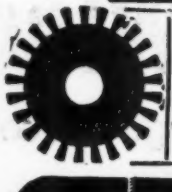
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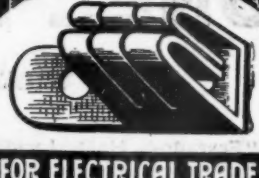
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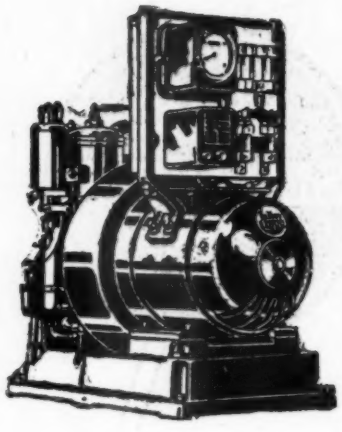

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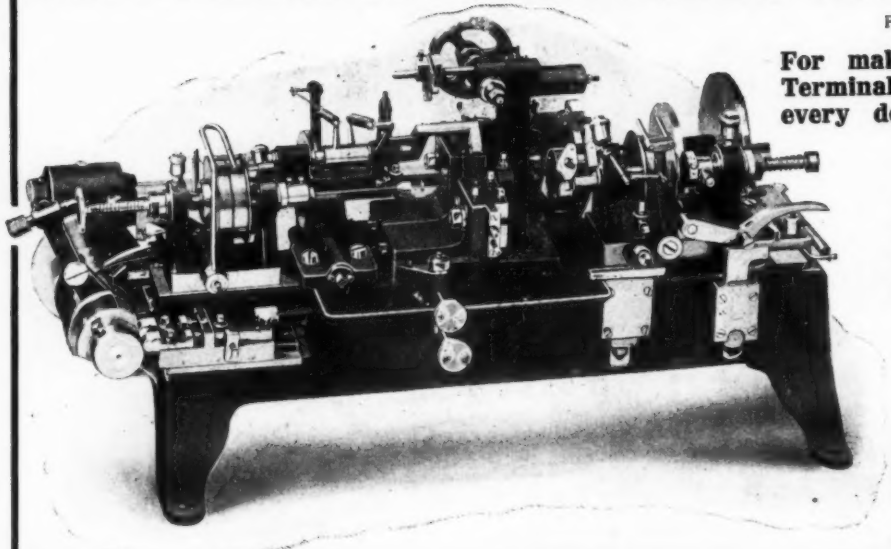

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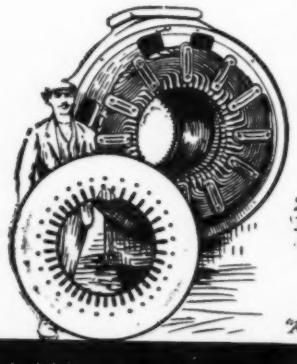

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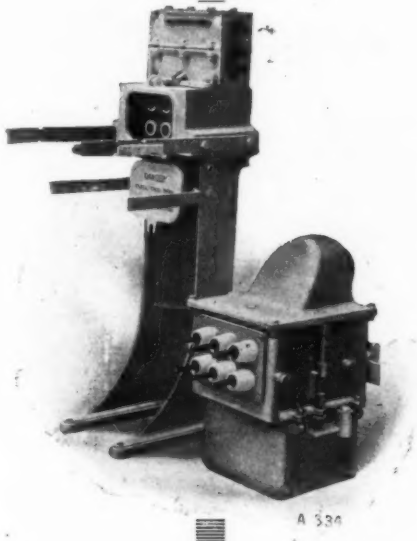

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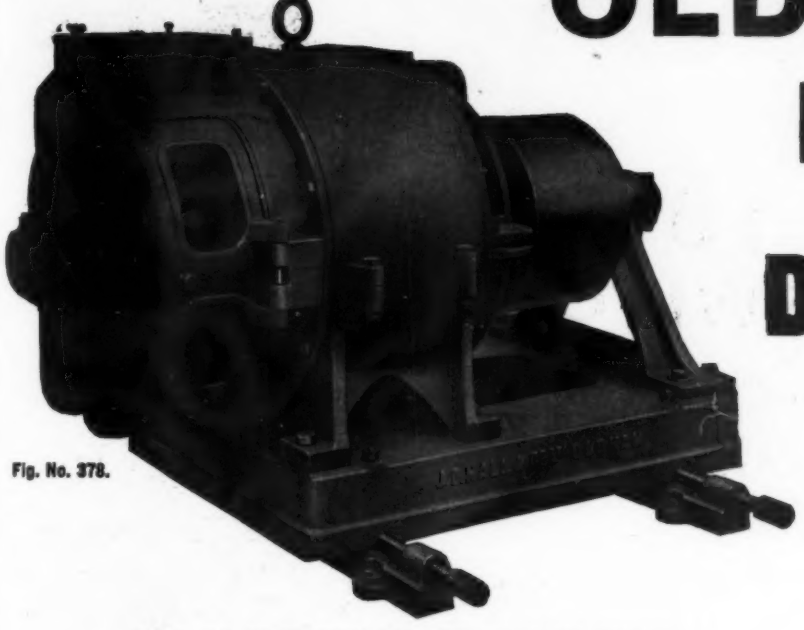

Fig. No. 378.

50-H.P. D.C. MOTOR WITH BEDPLATE AND OUTER BEARING.

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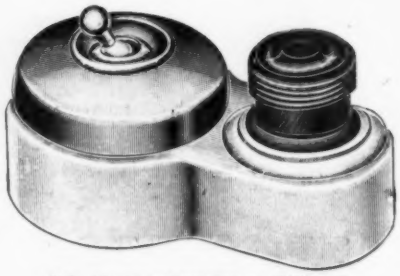
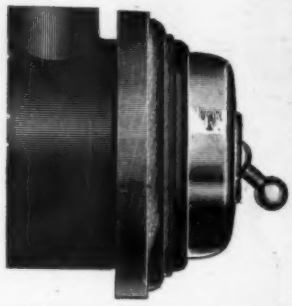
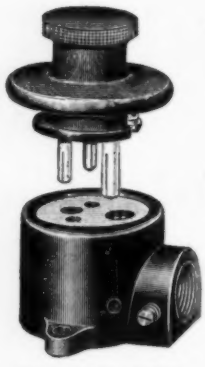


NO. 1275—COMBINED SWITCH AND PLUG.

NO. 136D.—QUICK MAKE AND BREAK SWITCH, WITH COMPLETE POSITIVE ACTION.



SEMI-RECESSED SWITCH, WITH BOX AND FRONT PLATE.



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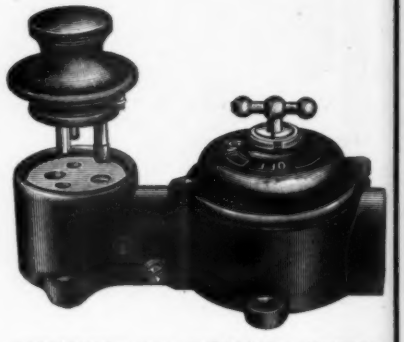

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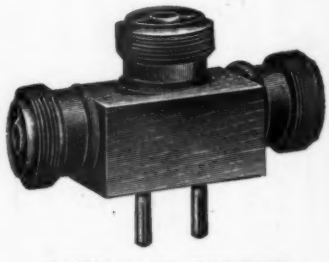

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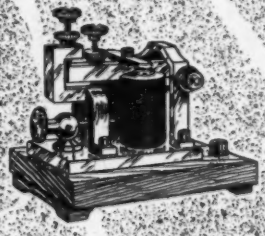

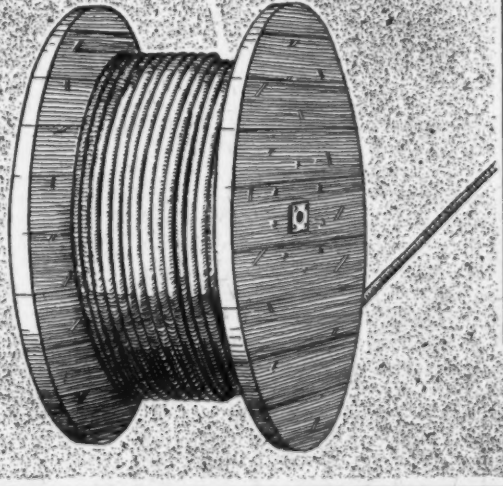

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